SERVICE DATA
FILE NO. 170-135

TOSHIBA

STEREO AMPLIFIER

SB-77

SPECIFICATIONS

■ **General**	
Power Supply:	220V ∿ 50 Hz for Europe 240V ∿ 50 Hz for United Kingdom & Australia
Power Consumption:	500W
Weight:	12 kg
Dimensions (W x H x D):	420 x 151 x 399 (mm)
■ **Amplifier**	
Continuous Power Output 20 Hz ∿ 20 kHz both ch. driven:	100W×2(4Ω), 100W×2 (8Ω)
Total Harmonic Distortion:	0.01% (at rated power 8Ω)
Frequency Response:	DC ∿ 80 kHz (+0 dB, −5 dB)
Power Band Width (IHF):	5 Hz ∿ 80 kHz
Damping Factor:	30 (CLEAN DRIVE OFF)

S/N (IHF A Network):	106 dB (TUNER/AUX) 86 dB (PHONO-MM) 69 dB (PHONO-MC)
Input Sensitivity/ Impedance:	PHONO (MM) 2.5mV/47 kΩ PHONO (MC) 0.25mV/100Ω TUNER 200mV/50 kΩ AUX/TAPE 200mV/50 kΩ
Output Level:	TAPE REC 200mV
Tone Control:	BASS (at 100 Hz) ±8 dB TREBLE (at 10 kHz) ±8 dB
Phono Overload Level:	MM 300 mV (RMS) MC 20 mV (RMS)

Specifications are subject to change without notice.

TE, TU

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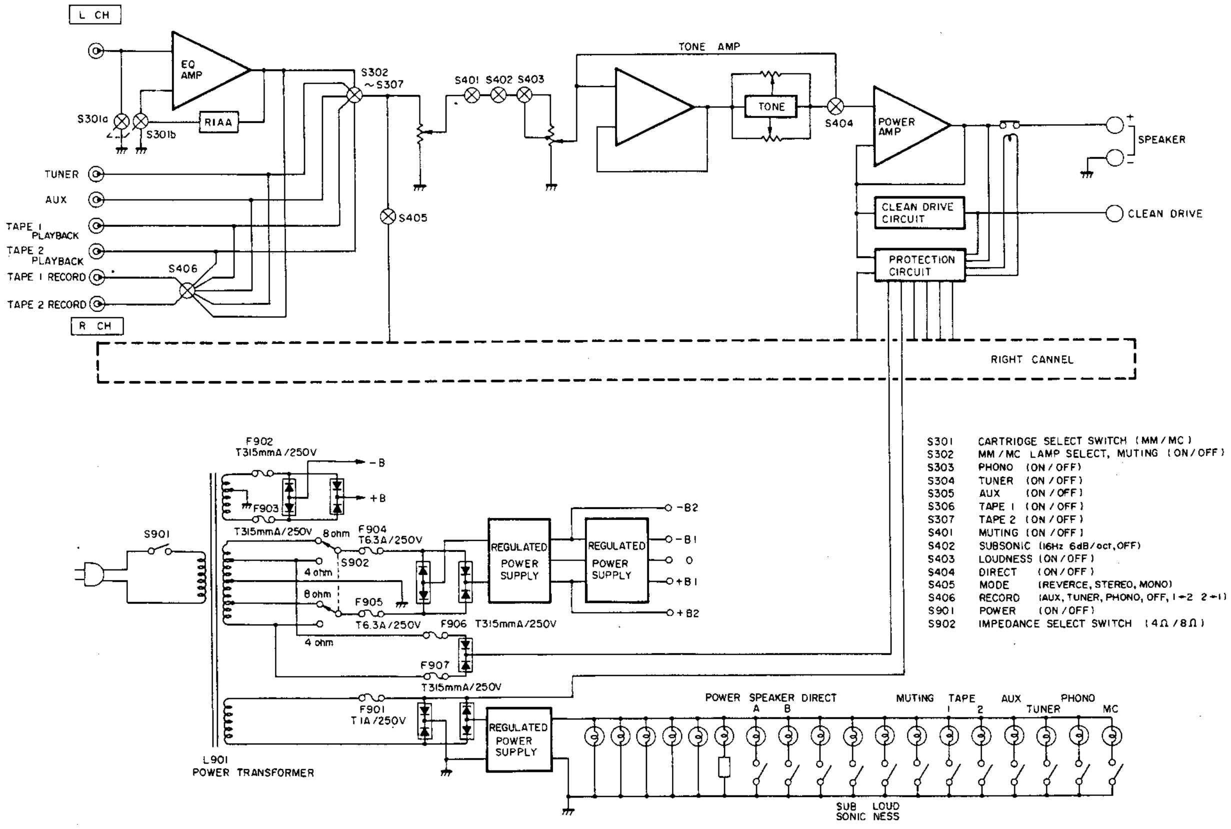
1. BLOCK DIAGRAM


L CH
EQ AMP
RIAA
S301a
S301b
S302 ~S307
S401 S402 S403
TONE AMP
TONE
S404
POWER AMP
SPEAKER
CLEAN DRIVE CIRCUIT
CLEAN DRIVE
PROTECTION CIRCUIT
S405
TUNER
AUX
TAPE 1 PLAYBACK
TAPE 2 PLAYBACK
TAPE 1 RECORD
TAPE 2 RECORD
S406
R CH
RIGHT CANNEL
F902 T315mmA/250V
F903
-B
+B
S901
T315mmA/250V
8 ohm
F904 T6.3A/250V
S902
4 ohm
8 ohm
F905
T6.3A/250V
F906 T315mmA/250V
4 ohm
REGULATED POWER SUPPLY
REGULATED POWER SUPPLY
-B2
-B1
0
+B1
+B2
F907
T315mmA/250V
F901 T1A/250V
REGULATED POWER SUPPLY
L901 POWER TRANSFORMER
POWER
SPEAKER A B
DIRECT
MUTING
TAPE 1 2
AUX
TUNER
PHONO
MC
SUB SONIC
LOUD NESS

S301	CARTRIDGE SELECT SWITCH (MM/MC)
S302	MM/MC LAMP SELECT, MUTING (ON/OFF)
S303	PHONO (ON/OFF)
S304	TUNER (ON/OFF)
S305	AUX (ON/OFF)
S306	TAPE 1 (ON/OFF)
S307	TAPE 2 (ON/OFF)
S401	MUTING (ON/OFF)
S402	SUBSONIC (16Hz 6dB/oct, OFF)
S403	LOUDNESS (ON/OFF)
S404	DIRECT (ON/OFF)
S405	MODE (REVERCE, STEREO, MONO)
S406	RECORD (AUX, TUNER, PHONO, OFF, 1→2 2→1)
S901	POWER (ON/OFF)
S902	IMPEDANCE SELECT SWITCH (4Ω/8Ω)

Figure 1

2. OPERATING CONTROLS

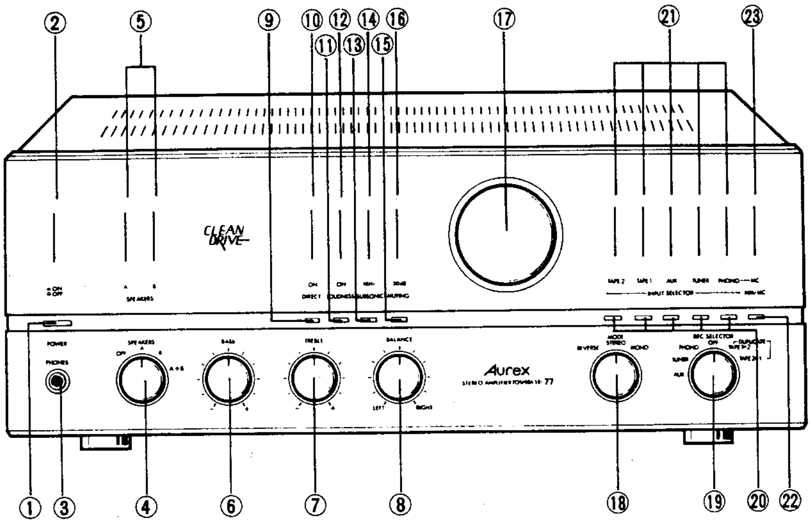


Figure 2

① **Power switch**
Press to turn the set ON. When the set comes ON, the Power indicator ② will light.

② **Power indicator**

③ **Phones**
Connect the headphone plug to this jack.

④ **Speaker switch**
This switch controls the rear panel speaker terminals.

A:	Sound output from the speaker system connected to the A terminals. The Clean Drive system can be used with this speaker system.
B:	Sound output from the speaker system connected to the B terminals. The Clean Drive system can be used with this speaker system.
A + B:	Sound output from both the A and B speaker systems. Clean drive does not operate in this position.
OFF:	Only the headphones operate.

⑤ **Speaker indicators**

⑥ ⑦ **Bass and Treble controls**
Turn the bass or treble tone control clockwise from the centre (tone defeat) position to emphasize bass or treble. Turn counterclockwise to decrease bass or treble.
These controls operate only when the DIRECT switch ⑨ is in the OFF position.

⑧ **Balance**
This control is used to adjust volume balance between the left and right speakers.

⑨ **Direct switch**
Depress this switch to the ON position to connect the input signal (from an equalizer, tuner, tape deck, etc.) directly to the power amplifier section. Leave this switch in the OFF position when you want to adjust the sound quality with the bass and tone controls.

⑩ **Direct indicator**

⑪ **Loudness switch**
Turn this switch ON when listening at low volume levels to emphasize the high and low frequencies.

⑫ **Loudness indicator**

⑬ **Subsonic filter**
Turn this switch ON to eliminate low frequency noise (caused mainly by record warps).

⑭ **Subsonic indicator**

⑮ **Muting switch**
This switch is used to temporarily reduce volume, for example, when you want to cut out stylus contact noise while cueing. When this switch is turned ON, volume will be reduced by about 20 dB and the muting indicator will illuminate.

⑯ **Muting indicator**

⑰ **Volume**
Use this control to adjust the volume level.

⑱ **Mode switch**
Use this switch to select between stereo and monaural sound reproduction. In the REVERSE position, the left and right channel output to the speakers is reversed.

⑲ **Recording selector switch**
Use this switch to select the audio source to be recorded and when copying (dubbing) from one tape deck to another.

AUX:	when recording from the component connected to the AUX terminals.
TUNER:	when recording from the tuner
PHONO:	when recording from the turntable
OFF:	leave in this position when not performing recording operations
TAPE 1 ▶ 2:	when recording from the deck connected to the TAPE 1 terminals to the deck connected to the TAPE 2 terminals.
TAPE 2 ▶ 1:	when recording from tape deck 2 to tape deck 1

⑳ **Input selector switches**

TAPE 1:	to listen to the deck connected to the TAPE 1 terminals.
TAPE 2:	to listen to the deck connected to the TAPE 2 terminals.
AUX:	to listen to the component connected to the AUX terminals
TUNER:	to listen to the tuner
PHONO:	to listen to the turntable; be sure the MM/MC switch is in the proper setting.

㉑ **Input indicators**
These light up to show which input selector switch has been depressed.

㉒ **MM/MC cartridge switch**
Depress to the MC position when using an MC type cartidge with the turntable and leave in the MM position (out) when using MM type cartridges. The MM/MC indicator directly above this switch will illuminate when the MC setting has been selected.

Note: No sound will be heard for a moment after this switch is changed to the MM or MC position because the muting circuit activates briefly. It is not a malfunction of this unit. The power indicator will flash on and off to show the muting circuit is working. The muting circuit will turn off in about 5 to 10 seconds and sound will be heard once again.

㉓ **MM/MC cartridge indicator**
This indicator illuminates when the MM/MC cartridge switch is in the MC position.

3. SYSTEM CONNECTIONS

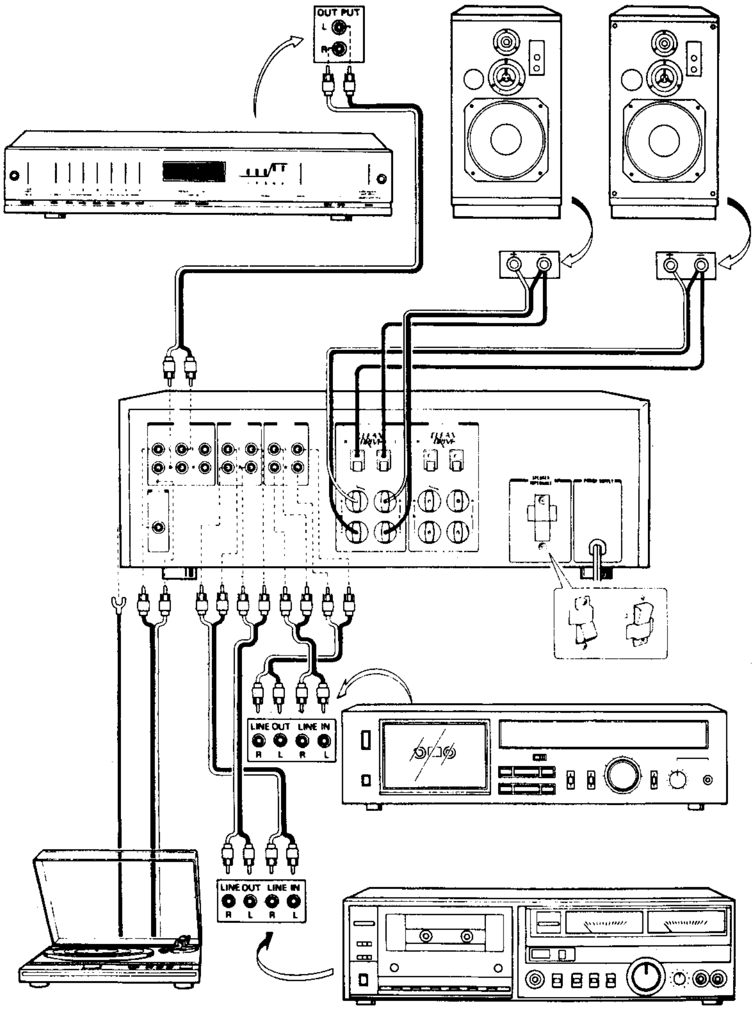


Figure 3

Note: Until all connections have been properly completed, do not plug the unit into the power supply receptacle or turn on the power switch.

■ Connection of speakers to the power amplifier

Connect the right speaker cord to the "R" terminal (speaker) and the left speaker to the "L" terminal (speaker) on the rear panel of the amplifier. Make sure the positive (+) cord is connected to the (+) terminal and the negative (−) and clean drive cords to the (−) terminal. Crossing these cords will cause loss of stereo output.

- * For speakers where the cords can not be disconnected, refer to page 17 for directions on connecting the clean drive cords.
- * Make absolutely certain the power switch of the amp is OFF when this connection is made.
- * Do not short-circuit the positive and negative speake connection.

Note: When speaker system A or B is used individually, an impedance rating of 4 ohms is acceptable. However, when both speaker systems are used together (A + B), both speaker systems must have an impedance rating of at least 8 ohms.

- **Speaker impedance selector (Rear panel)**

This selector is set according to the chart below when shipped. It may cause overheating when speakers of less than 8 ohms are used with this selector in the 8 ohm position (especially those of U.K. and Australia models). If the desired speakers are of different impedance from the chart below, consult your dealer.

Area	Selector	Usable speaker	Power supply
Europe	4Ω	4Ω or more	AC 220V
The U.K. and Australia	8Ω	8Ω or more	AC 240V

■ Connecting a turntable

Connect the output cables from the turntable to the PHONO terminals of the amplifier. If the turntable is equipped with a ground wire, or the instruction manual recommends the use of one, be sure to connect it to the GND terminal of the amplifier. Failure to do this may result in hum or howling noise.

■ Connecting a tuner

Connect the tuner output cables to the TUNER input terminals on the rear panel of the amplifier. No ground between the tuner and amp is necessary.

■ Connecting a tape deck

Connect the tape deck input terminals (LINE IN) to the amplifier record terminals (REC), and the tape deck output terminals (LINE OUT) to the amplifier playback (PLAY) terminals. One or two tape decks can be connected at once.

4. OPERATION

■ Confirm that the front panel controls are in the following positions before the power is turned on:

1. Volume control all the way to the left (minimum).
2. Balance in centre position.
3. Tone controls (BASS, TREBLE) in centre zero position.

■ Listening to records

1. Depress the PHONO Input selector switch.
2. Set the MM/MC cartridge selector switch to the proper setting for the cartridge in use.
3. Begin record playback and adjust the volume and tone controls as desired.
4. When changing records, depress the Mutting switch or turn down the Volume control before lifting the stylus off the record.

■ AM/FM broadcasts

1. Depress the TUNER Input selector switch.
2. Tune in the desired broadcast and adjust the volume and tone controls as desired.

■ Listening to tapes

1. Depress the TAPE 1 or TAPE 2 Input selector switch.
2. Put the tape deck in the playback mode and adjust the volume and tone controls as desired.

■ Listening to components connected to the AUX terminals

1. Depress the AUX Input selector switch.
2. Put the component in the playback mode and adjust the volume and tone controls as desired.

■ To record

Prepare the program source (turntable, tuner, etc.) to be recorded. Set the recording selector switch ⑲ to the program source and set the tape deck to record following the tape deck instruction manual. Note that while recording, the amplifier volume and tone controls will have no effect on the recording level or tone.

- Because the input selector and rec selector are independent controls, you can listen to one audio source while recording from another. For example, you can listen to the tuner while recording a record from the turntable.
- If your tape deck has a monitoring capability, depress the input selector button corresponding to that tape deck during recording to monitor the just recorded signal.

■ To copy (dub) a tape

To record from the tape deck connected to the TAPE 1 terminals on the rear panel to the deck connected to the TAPE 2 terminals:

(a) Set the recording selector switch 19 to the TAPE 1 ▶ TAPE 2 position.

(b) Put deck 1 in the playback mode and deck 2 in the recording mode.

Note: If the mode switch is in the MONO position during dubbing, the signal recorded may also be switched to the monaural mode.

5. DISASSEMBLY INSTRUCTIONS

REMOVAL OF TOP COVER

1. Remove six screws (A) and (B) (4φ x 10mm) from both sides of top cover, then top cover can be removed from the unit as shown in Figures 4 and 5.

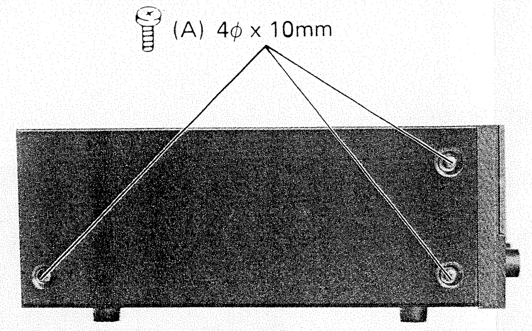


Figure 5

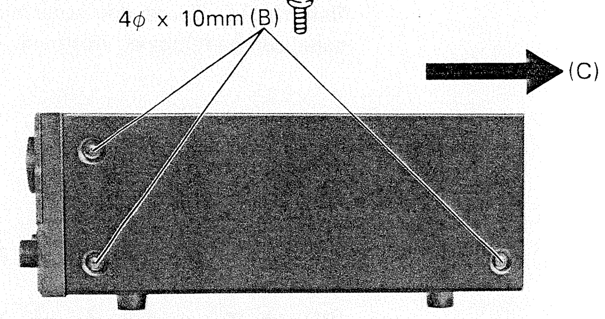


Figure 4

REMOVAL OF BOTTOM PLATE

1. Remove six screws (D) (3φ x 6mm) holding bottom plate, then bottom plate can be removed from the unit as shown in Figure 6.

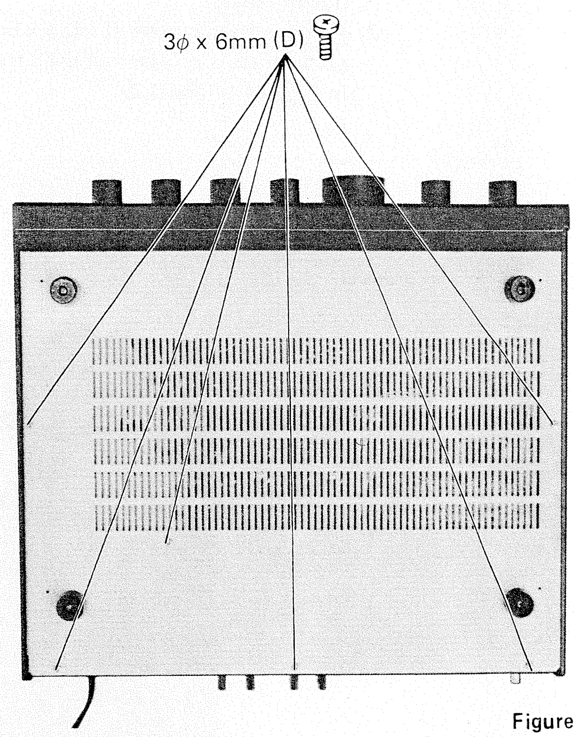


Figure 6

REMOVAL OF FRONT PANEL

1. Remove top cover as shown in Figures 4 and 5.
2. Remove seven knobs (E) as shown in Figure 7.
3. Remove one screw (F) (3φ x 10mm) placed under volume knob and hex nut holding VR ring.
4. Remove six screws (H) (3φ x 8mm) placed under clean drive knob and tape knob.
5. Remove seven seven nuts (G) holding speaker knob, bias knob and balance knob as shown in Figure 8.

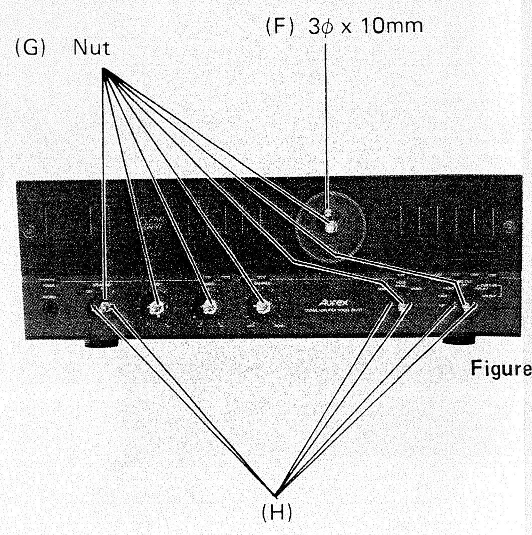


Figure 8

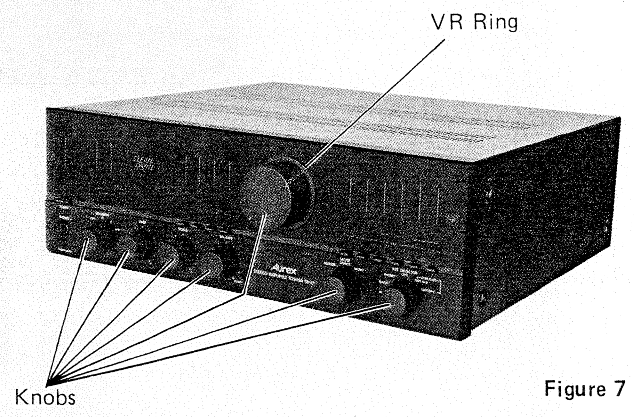


Figure 7

6. Remove four screws (I) and (J) (3φ x 8mm) of sides panel plate holding side plate as shown in Figures 9 and 10.
7. Remove P.C. Board and other installated panels. Then, panel can be removed from unit.

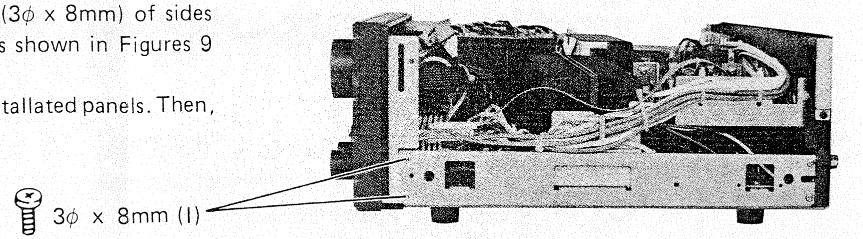


Figure 9

REMOVAL OF EQUALIZER AMP AND POWER SUPPLY P.C. BOARD

1. Remove two screws (K) (3φ x 8mm) holding the bottom plate.
2. Remove four screws (L) (3φ x 8mm) holding the jack plate, then it can be removed from the unit as shown in Figures 11 and 12.

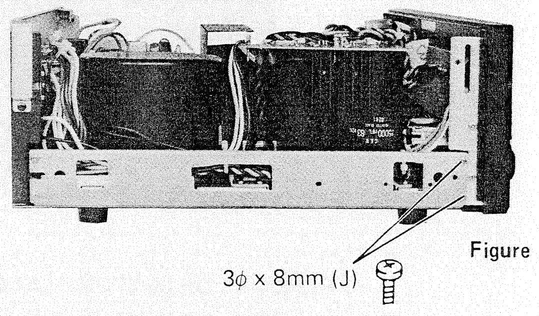


Figure 10

3φ x 8mm (K)

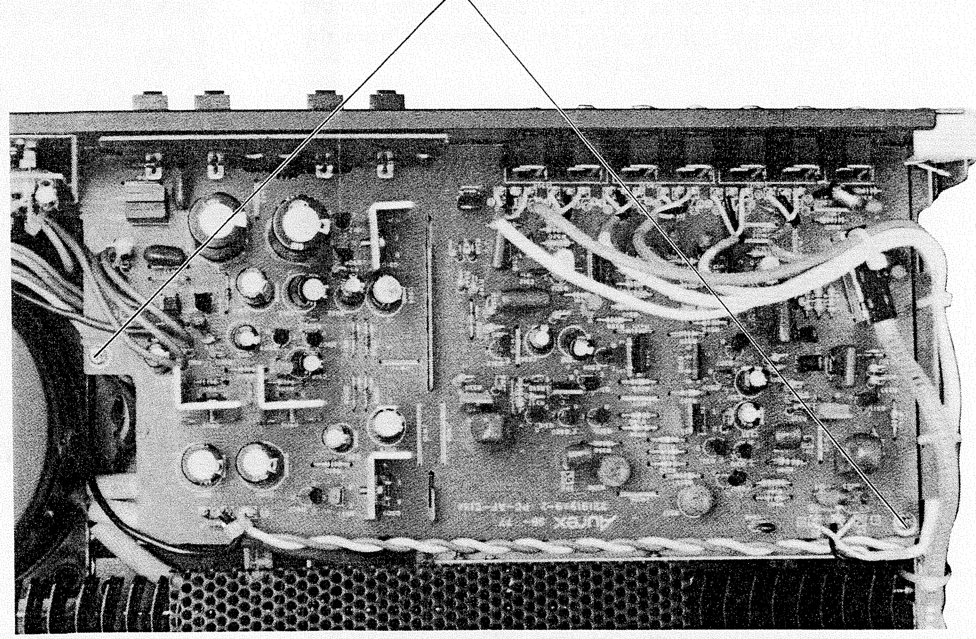


Figure 11

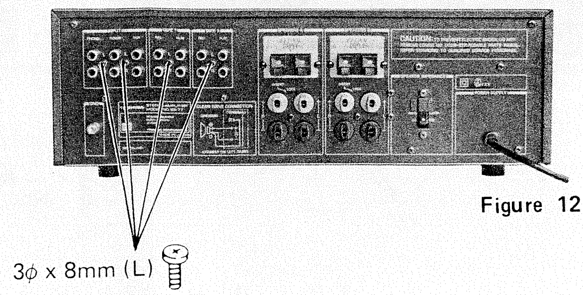


Figure 12

6. ADJUSTMENTS

ADJUSTMENT PREPARATION

- Switch S903 (Speaker Impedance Switch) must be set in the 8Ω position.

CAUTION
When using TE, exchange the bracket and change switch to the 8 ohm position.

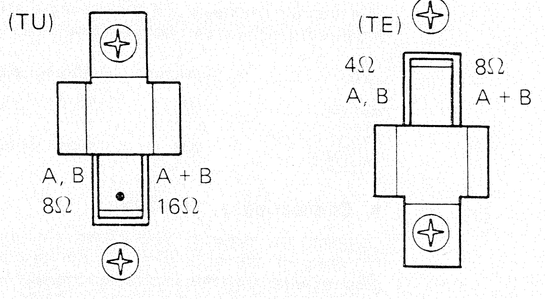
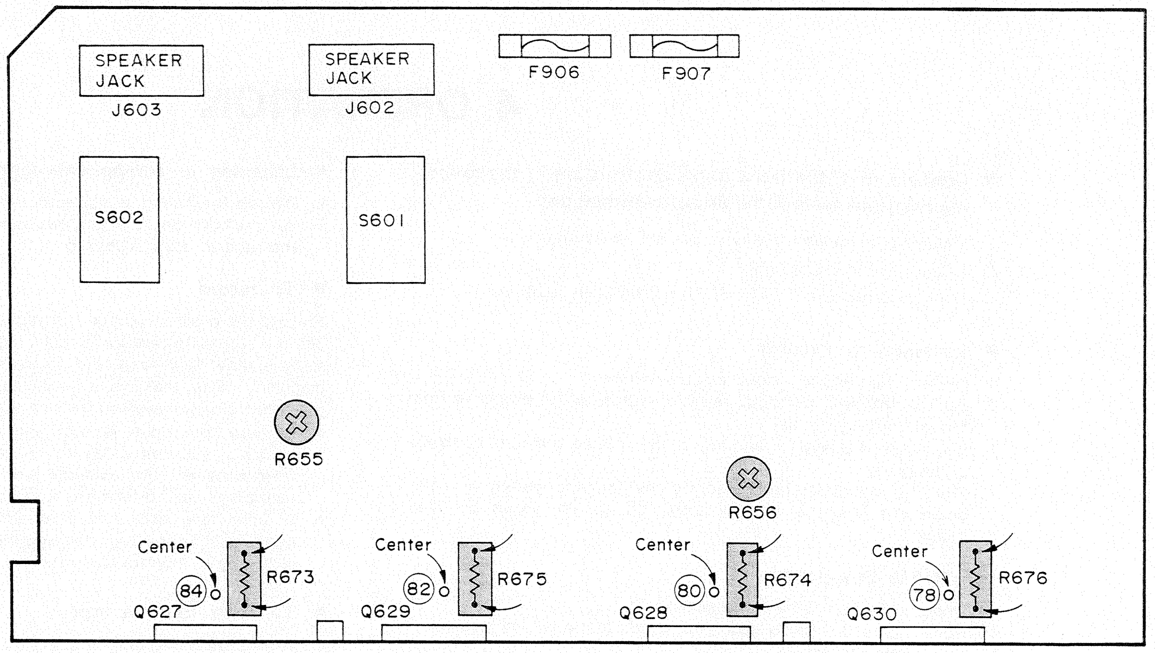

(TU)
A, B
8Ω
A + B
16Ω
(TE)
4Ω
A, B
8Ω
A + B

Figure 13

Idle current adjustment

Adjustment parts : R655 (L), R656 (R)
Measurement parts : Both sides (L) of R673 or R675
Both sides (R) of R674 or R676
Measurement method :
(1) Adjust for 5mV at 2 minutes after switching power on.
(2) Adjust for 13.2 to 17.6mV 10 minutes later.
(Match voltages of L and R.)


SPEAKER JACK
J603
SPEAKER JACK
J602
F906
F907
S602
S601
R655
R656
Center
84
Q627
R673
Center
82
Q629
R675
Center
80
Q628
R674
Center
78
Q630
R676

Main Amp & Protector P.C.Board

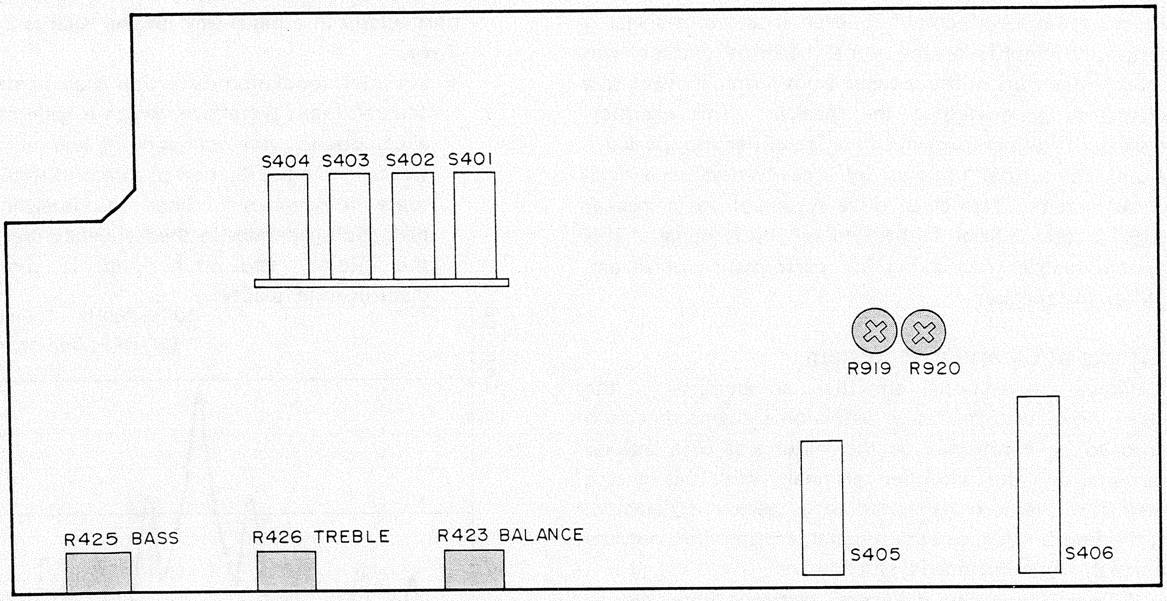
Figure 14

Main Amplifier Zero Point Adjustment

Adjustment parts : R919 (L), R920 (R)

Measurement parts : Middle point between R673 and P675
Middle point between R674 and R676

Measurement method : Adjust middle points for 0V.


S404
S403
S402
S401
R919
R920
R425 BASS
R426 TREBLE
R423 BALANCE
S405
S406

Pre Amp & Clean Drive P.C.Board

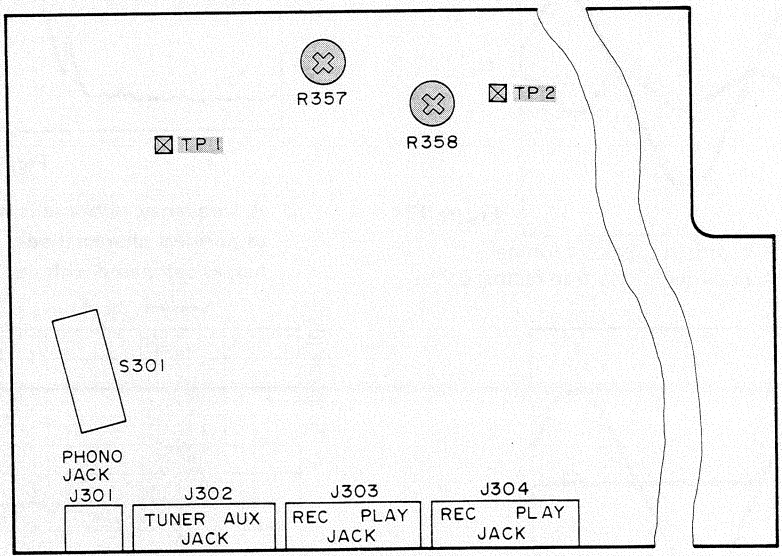
Figure 15

Equalizer Zero Point Adjustment

Adjustment parts : R357 (L), R358 (R)

Measurement parts : TP-1 (L), TP-2 (R)

Measurement method : Adjust T.P. points for 0V.


R357
R358
TP 1
TP 2
S301
PHONO JACK
J301
J302
TUNER AUX JACK
J303
REC PLAY JACK
J304
REC PLAY JACK

Equalizer Amp & Power Supply P.C. Board

Figure 16

7. TECHNICAL INSTRUCTIONS

Clean drive system

Purpose of Development

In a conventional amplifier, even if an input signal is faithfully amplified, the signal becomes unclear with much distortion at the speaker input terminal owing to a distortion generated in the speaker. This obstructs display of full performance of an amplifier and speaker. Aurex solves this problem by a newly developed clean drive system. The clean drive system drives a speaker with a clean signal faithful to an input signal. This system realizes displaying full performance of an amplifier and speaker.

Effects of Clean Drive System

Unlike a conventional amplifier, an amplifier of the clean drive system has a distortion element detection cord to be connected to the minus side of a speaker terminal and the amplifier terminal. With this cord, a distortion element generated in a speaker is detected, and based on this detection signal, the amplifier outputs a signal with minimized distortion.

1 **A high frequency distortion factor is improved to about 1/10 (at the speaker input terminal, as compared with our conventional system).**

- A high frequency distortion factor is a ratio of the integer multiple of the frequency element other than the input waveform appeared in the output when a sign wave signal of certain frequency is entered. A larger high-frequency distortion factor degrades tone quality.

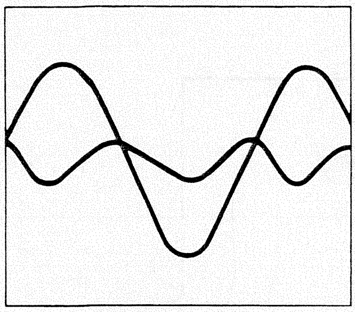


Figure 17

Distortion waveform at speaker terminal
Conventional amplifier (Distortion factor: 0.2%)

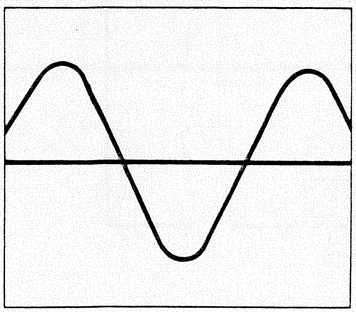


Figure 18

Input waveform of the speaker system of the clean drive system (Distortion factor: 0.005%)

2 **Generation of a intermodulation distortion (IM) is largely suppressed (at the speaker terminal, as compared with our conventional system). The effect is great particularly in a multi-way speaker such as 2-way and 3-way.**

- An intermodulation distortion is an element other than an input waveform, which is generated when a compound wave consisting of two or more sine waves, and has a relation of sum or difference with these frequencies. Since the intermodulation distortion generates in the frequency that is not in the integer ratio relationship, it considerably disturbs tone quality.

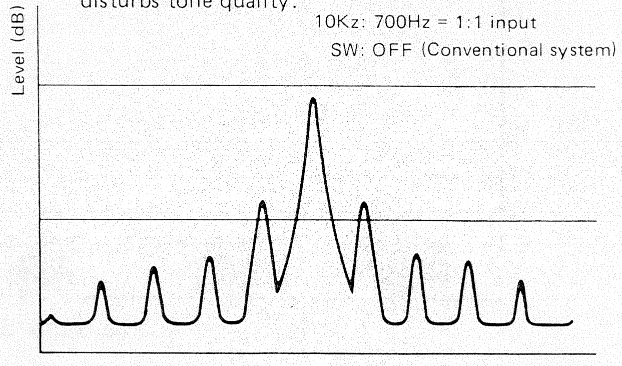


Figure 19

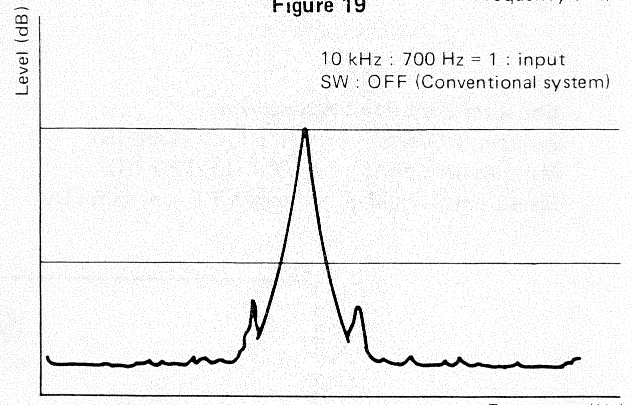


Figure 20

3 **A frequency response is remarkably improved, as flat as an ideal characteristic (at the speaker input terminal, as compared with our conventional system).**

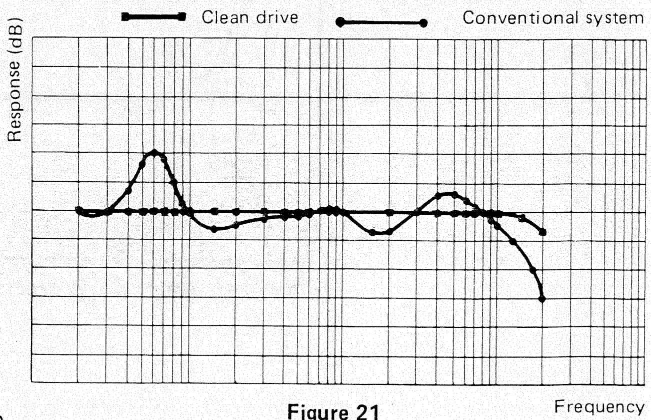


Figure 21

4 **A distortion can be minimized in any combination regardless of the kind of speakers to be connected.**

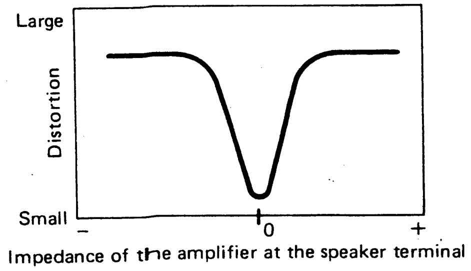


Figure 22

5 **An influence of the impedance of the speaker cord is very small. It is unnecessary to consider the length, thickness and kind of a cord.**

6 **A power amplifier itself is fully used, and degradation of tone quality is little, providing an optimum effect without adjustment.**

Since use of the clean drive system decreases remarkably a high-frequency distortion factor and generation of an intermodulation distortion, an input signal can be reproduced with high fidelity, resulting (1) clean high-frequency range, (2) clear middle-range sound and (3) solid low-range sound.

The tone quality is improved in all frequency ranges.

What is the Clean Drive System

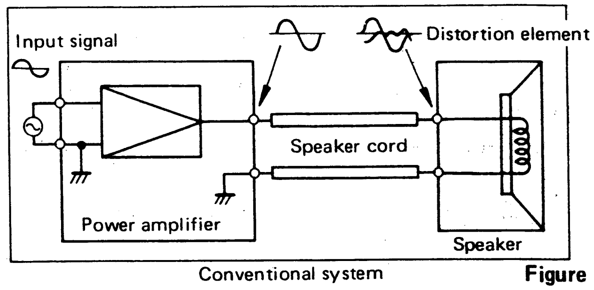
Like a microphone, a speaker has the property to generate an electricity when a coil moves. When a signal is entered into a speaker, an electromotive force is generated in the inverse direction to the input (back electromotive force).

Since this electromotive force is not completely proportional to an input signal due to an uneven magnetic field or uneven mechanical strength of an edge, the unproportioned part appears as a distortion at the speaker terminal. Since a speaker cord and amplifier has as resistor element, this distortion appears as a distortion at the speaker.

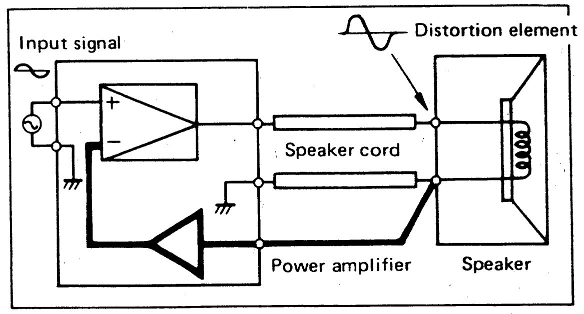
The clean drive system detects the above distortion element by means of a detection cord. (Little current flows in this cord, and no voltage drop occurs, permitting measurement of the voltage at the speaker terminal. The speaker cord resistance is also measured by this measurement.) The amplifier output can be increased and decreased simply by cancelling this voltage (distortion element). The loss of the amplifier output generated by the speaker cord resistance is also cancelled by the same way, and the voltage at the speaker input terminal becomes equal to the amplifier output voltage (complete constant voltage drive). In this way, the clean drive system cancells a distortion element and loss in the speaker code, and drives the speaker with a clean signal faithful to an input signal. Since an influence of the cord is eliminated, the frequency response becomes flat.

When seening the amplifier from the speaker input terminal, the resistance of the speaker cord is cancelled and the impedance becomes substantially zero(zero impedance drive).

This means that a damping factor is substantially infinite at the speaker input terminal.



Conventional system Figure 23



Newly developed clean drive system amplifier Figure 24

Principle of Clean Drive

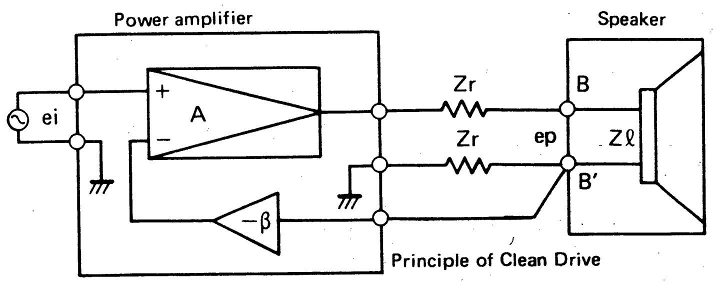


Figure 25

ei: Input signal
ep: Voltage at the speaker terminal (BB')
Zr: Speaker cord impedance
Zℓ: Speaker cord impedance (including a non-linear component)
A: Amplifier gain
β: Feeback gain

The voltage (ep) between the speaker terminals B and B' is obtained by the following equation.

(1) Conventional system

$$ep = A \cdot \frac{1}{1 + \frac{2Zr}{Z\ell}} \cdot ei \text{ - - - - - - - - - - - } \text{①}$$

This equation includes the term of a speaker impedance Zℓ. Since the Zℓ varies according to the frequency and contains a non-linear component, it is seen that the voltage at the speaker terminal has much distortion.

(2) Clean drive

$$ep = A \cdot ei \text{ - - - - - - - - - - - - - - - - } \text{②}$$

Assuming that β = 2/A, the voltage can be obtained by the following equation.

This equation doesn't have Zℓ and Zr terms, and it is seen that the voltage is proportional to an input voltage and has no distortion.

(Reference) Assuming that the voltage between the speaker terminals A and A' is e_0 with SW ON:

$$\left(ei + \frac{e_0\, Zr}{2Zr + Z\ell}\, \beta\right) A = e_0$$

$$eiA + \frac{e_0\, Zr\, \beta A}{2Zr + Z\ell} = e_0$$

$$eiA\,(2Zr + Z\ell) + e_0\, Zr\, \beta A = e_0\,(2Zr + Z\ell)$$

$$e_0\,(2Zr + Z\ell - Zr\,\beta A) + eiA\,(2Zr + Z\ell)$$

$$e_0 = \frac{(2Zr + Z\ell)\, eiA}{2Zr + Z\ell - Zr\,\beta A} \text{ - - - - - - - - - - - - } \text{①}$$

where,

$$e_0 = \frac{Z\ell}{2Zr + Z\ell} \cdot e_0 \text{ - - - - - - - - - - } \text{②}$$

Thus, when substituting the equation (2) and (1),

$$ep = \frac{Z\ell}{(2Zr + Z\ell)} \cdot \frac{(2Zr + Z\ell)\, eiA}{(2Zr + Z\ell - r\,\beta A}$$

$$= \frac{ei \cdot A \cdot Z\ell}{2Zr + Z\ell - Zr\,\beta A}$$

Assuming that $\beta = \frac{2}{A}$ in this equation,

$$ep = \frac{ei\, A\, Z\ell}{2Zr + Z\ell - ZrA \cdot \frac{2}{A}}$$

$$= \frac{ei\, A\, Z\ell}{2Zr + Z\ell - 2Zr}$$

$$= \frac{ei\, A\, Z\ell}{Z\ell} = eiA$$

Circuit Configuration of SB-77 Clean Drive

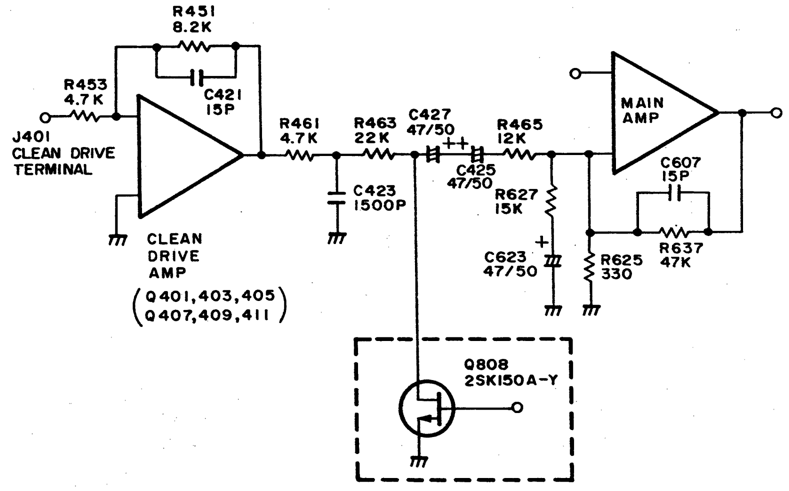


Figure 26

$$\beta = \frac{\dfrac{R451}{R453}}{\dfrac{(R461 + R463 + R465) + R625//R627//R637}{R625//R627//R637}}$$

R461 + R463 + R465 = 4.7K + 22K +12K = 38.7K
R625//R627//R637 = 330//15K//47K
= 330//11.371K ≒ 320 Ω

$$\therefore \beta = \frac{\dfrac{8.2K}{4.7K}}{\dfrac{38.7K + 320\,\Omega}{320\,\Omega}} = \frac{1.74}{12.2} ≒ 0.01$$

$$\frac{2}{A} = \frac{2}{\dfrac{R625 + R637}{R625}} = 2 \cdot \frac{330}{330 + 47K} ≒ 0.01$$

Protection Circuit for Clean Drive

This circuit protects an amplifier and speaker when the distortion detection cord is mistakenly connected to the plus side of a speaker.

Oscillating signal is used, which is generated by connecting the cord for clean drive detection with (–) side of speaker terminals.

The signal goes into the gate of Q810, Q811 and Q812 are turned on, the gate voltage of Q813 rises up and the drain current flows.

Then the base voltage of Q814 goes down and Q814 is turned on.

The gate voltage of Q808 goes up by the collector current of Q814 and impedance between the drain and the source of Q808 becomes lower. Therefore, the regular return loop is interrupted, oscillating signal is prevented and the speaker is protected.

PRE AMP & CLEAN DRIVE P.C. BOARD
EQUALIZER AMP & POWER SUPPLY P.C. BOARD
FUNCTION SWITCH P.C. BOARD
LAMP P.C. BOARD

8. ELECTRICAL PARTS LOCATIONS

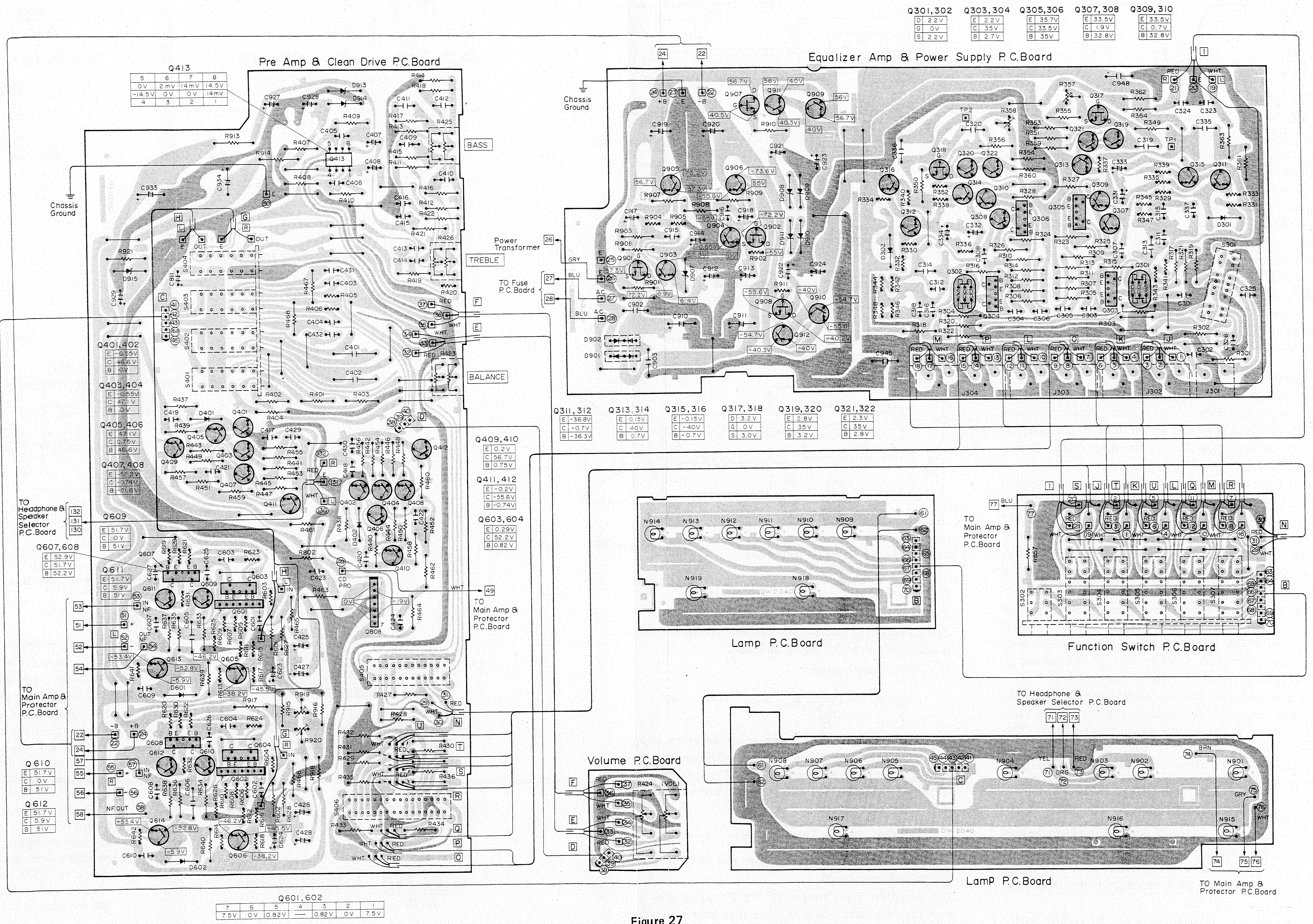

Pre Amp & Clean Drive P.C.Board
Equalizer Amp & Power Supply P.C.Board
Function Switch P.C.Board
Lamp P.C.Board
Volume P.C.Board
Lamp P.C.Board
Chassis Ground
Chassis Ground
Power Transformer
TO Fuse P.C.Board
BASS
TREBLE
BALANCE
TO Headphone & Speaker Selector P.C.Board
TO Main Amp & Protector P.C.Board
TO Main Amp & Protector P.C.Board
TO Main Amp & Protector P.C.Board
TO Headphone & Speaker Selector P.C.Board
TO Main Amp & Protector P.C.Board
Q413: 5 / 6 / 7 / 8 — 0V / 2mV / 14mV / 14.5V
Q413: 4 / 3 / 2 / 1 — -14.5V / 0V / 0V / 14mV
Q301,302: D 2.2V, G 0V, S 2.2V
Q303,304: E 2.2V, C 35V, B 2.7V
Q305,306: E 35.7V, C 33.5V, B 35V
Q307,308: E 33.5V, C 1.9V, B 32.8V
Q309,310: E 33.5V, C 0.7V, B 32.8V
Q311,312: E -36.8V, C -0.7V, B -36.3V
Q313,314: E 0.15V, C 40V, B 0.7V
Q315,316: E -0.15V, C -40V, B -0.7V
Q317,318: D 3.2V, G 0V, S 3.0V
Q319,320: E 2.8V, C 35V, B 3.2V
Q321,322: E 2.3V, C 35V, B 2.8V
Q401,402: E -0.55V, C 46.6V, B 0V
Q403,404: E -0.55V, C 47.1V, B 0V
Q405,406: E 47.1V, C 0.75V, B 46.6V
Q407,408: E -52.2V, C -0.74V, B -51.6V
Q409,410: E 0.2V, C 56.7V, B 0.75V
Q411,412: E -0.2V, C -55.6V, B -0.74V
Q603,604: E 0.29V, C 52.2V, B 0.82V
Q609: E 51.7V, C 0V, B 51V
Q607,608: E 52.9V, C 51.7V, B 52.2V
Q611: E 51.7V, C 5.9V, B 51V
Q610: E 51.7V, C 0V, B 51V
Q612: E 51.7V, C 5.9V, B 51V
Q601,602: 7 / 6 / 5 / 4 / 3 / 2 / 1 — 7.5V / 0V / 0.82V / — / 0.82V / 0V / 7.5V

Figure 27

MAIN AMP & PROTECTOR P.C. BOARD
POWER SUPPLY P.C. BOARD
HEADPHONE JACK & SPEAKER SELECT SWITCH P.C. BOARD

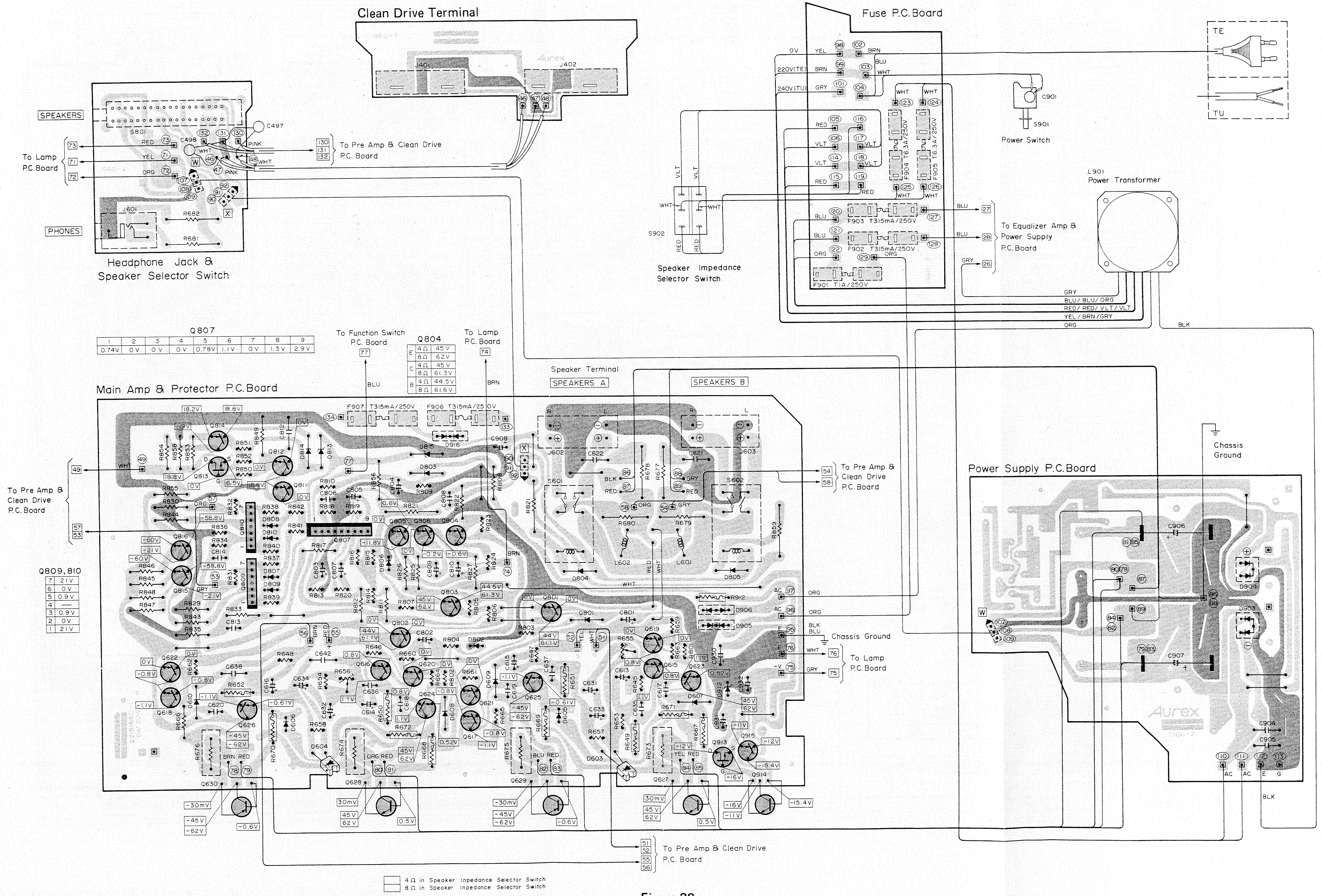
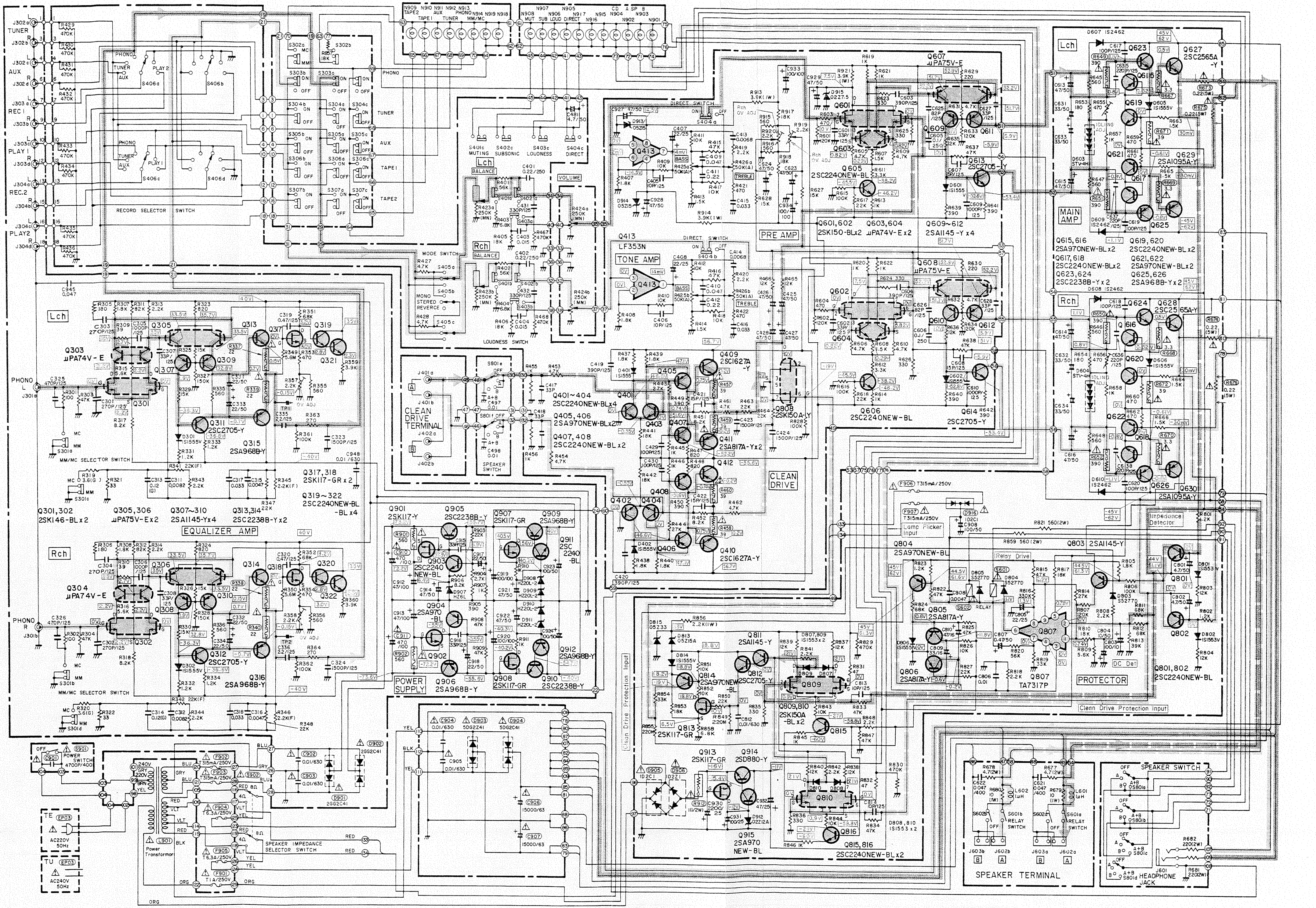
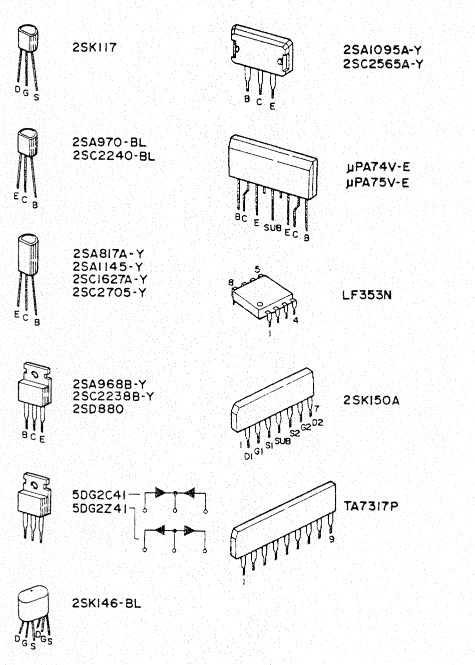

Clean Drive Terminal
J401
J402
SPEAKERS
S801
C497
C498
To Lamp P.C. Board
73
71
72
130
131
132
To Pre Amp & Clean Drive P.C. Board
PHONES
J601
R682
R681
Headphone Jack & Speaker Selector Switch
Fuse P.C. Board
0V
220V(TE)
240V(TU)
YEL
BRN
GRY
BLU
WHT
RED
VLT
ORG
F904 T6.3A/250V
F905 T6.3A/250V
F903 T315mA/250V
F902 T315mA/250V
F901 T1A/250V
27
28
26
To Equalizer Amp & Power Supply P.C. Board
C901
S901
Power Switch
TE
TU
L901
Power Transformer
GRY
BLU/BLU/ORG
RED/RED/VLT/VLT
YEL/BRN/GRY
ORG
BLK
S902
Speaker Impedance Selector Switch
Q807
1 2 3 4 5 6 7 8 9
0.74V 0V 0V 0V 0.78V 1.1V 0V 1.3V 2.9V
To Function Switch P.C. Board
77
Q804
E 4Ω 45V
E 8Ω 62V
C 4Ω 45V
C 8Ω 61.3V
B 4Ω 44.5V
B 8Ω 61.6V
To Lamp P.C. Board
74
Speaker Terminal
SPEAKERS A
SPEAKERS B
Main Amp & Protector P.C. Board
F907 T315mA/250V
F906 T315mA/250V
To Pre Amp & Clean Drive P.C. Board
49
57
53
Q809, 810
7 21V
6 0V
5 0.9V
4 —
3 0.9V
2 0V
1 21V
J602
J603
S601
S602
L602
L601
D804
D805
To Pre Amp & Clean Drive P.C. Board
54
58
Chassis Ground
To Lamp P.C. Board
76
75
Power Supply P.C. Board
Chassis Ground
C906
C907
D904
D903
C904
C905
AC
AC
E
G
Aurex
51
52
55
56
To Pre Amp & Clean Drive P.C. Board
4Ω in Speaker Inpedance Selector Switch
8Ω in Speaker Inpedance Selector Switch

Figure 28

9. SCHEMATIC DIAGRAM


J302a TUNER
J302c AUX
J303a REC1
J303c PLAY1
J304a REC2
J304c PLAY2
RECORD SELECTOR SWITCH
S406a
S406b
PHONO
TUNER
AUX
TAPE1
TAPE2
DIRECT SWITCH
S401c MUTING
S402c SUBSONIC
S403c LOUDNESS
S404c DIRECT
BALANCE
VOLUME
MODE SWITCH
MONO
STEREO
REVERCE
LOUDNESS SWITCH
Lch
Rch
Q303 μPA74V-E
Q304 μPA74V-E
MM/MC SELECTOR SWITCH
Q301,302 2SK146-BLx2
Q305,306 μPA75V-Ex2
Q307~310 2SA1145-Yx4
Q313,314 2SC2238B-Yx2
Q317,318 2SK117-GRx2
Q319~322 2SC2240NEW-BLx4
EQUALIZER AMP
Q413 LF353N
TONE AMP
PRE AMP
Q601,602 2SK150-BLx2
Q603,604 μPA74V-Ex2
Q609~612 2SA1145-Yx4
Q607 μPA75V-E
Q608 μPA75V-E
Q401~404 2SC2240NEW-BLx4
Q405,406 2SA970NEW-BLx2
Q407,408 2SC2240NEW-BLx2
Q409 2SC1627A-Y
Q410 2SC1627A-Y
Q411 2SA817A-Yx2
Q409 2SK150A-Y
CLEAN DRIVE TERMINAL
CLEAN DRIVE
SPEAKER SWITCH
MAIN AMP
Q615,616 2SA970NEW-BLx2
Q617,618 2SC2240NEW-BLx2
Q623,624 2SC2238B-Yx2
Q619,620 2SC2240NEW-BLx2
Q621,622 2SA970NEW-BLx2
Q625,626 2SA968B-Yx2
Q627 2SC2565A-Y
Q629 2SA1095A-Y
Q606 2SC2240NEW-BL
Q614 2SC2705-Y
Q901 2SK117-Y
Q905 2SC2238B-Y
Q907 2SK117-GR
Q909 2SA968B-Y
Q911 2SC2240-BL
Q904 2SA970-BL
Q906 2SA968B-Y
Q908 2SK117-GR
Q910 2SC2238B-Y
Q912 2SA968B-Y
POWER SUPPLY
Q804 2SA970NEW-BL
Q803 2SA1145-Y
Relay Drive
Lamp Flicker Input
Impedance Detector
Q805 2SA817A-Y
Q807 TA7317P
Q801,802 2SC2240NEW-BL
DC Det
PROTECTOR
Clean Drive Protection Input
Q811 2SA1145-Y
Q812 2SA970NEW-BL
Q809,810 2SK150A-BLx2
Q813 2SK117-GR
Q815,816 2SC2240NEW-BLx2
Q913 2SK117-GR
Q914 2SD880-Y
Q915 2SA970 NEW-BL
POWER SWITCH
Power Transformer
SPEAKER IMPEDANCE SELECTOR SWITCH
AC220V 50Hz
AC240V 50Hz
SPEAKER TERMINAL
HEADPHONE JACK


2SK117
D G S
2SA1095A-Y
2SC2565A-Y
B C E
2SA970-BL
2SC2240-BL
E C B
μPA74V-E
μPA75V-E
2SA817A-Y
2SA1145-Y
2SC1627A-Y
2SC2705-Y
LF353N
2SA968B-Y
2SC2238B-Y
2SD880
B C E
2SK150A
5DG2C41
5DG2Z41
TA7317P
2SK146-BL
D G S D G S

1)

S301 : Cartridge Select Switch(MM/MC)------------- MM Position
S302 : Push Switch(MM/MC Lamp Select/Muting)--- OFF Position
S303 : Push Switch(PHONO)-------------------------- ON Position
S304 : Push Switch(TUNER)-------------------------- OFF Position
S305 : Push Switch(AUX)----------------------------- OFF Position
S306 : Push Switch(TAPE 1)------------------------- OFF Position
S307 : Push Switch(TAPE 2)------------------------- OFF Position
S401 : Push Switch(MUTING)------------------------ OFF Position
S402 : Push Switch(SUBSONIC)---------------------- OFF Position
S403 : Push Switch(LOUDNESS)--------------------- OFF Position
S404 : Push Switch(DIRECT)------------------------ ON Position
S405 : Selector Switch(MODE)---------------------- STEREO Position
S406 : Selector Switch(RECORD)------------------- OFF Position
S601 : Relay Switch (SPEAKER)-------------------- OFF Position
S602 : Relay Switch (SPEAKER)-------------------- OFF Position
S801 : Speaker Select Switch(A/B)--------------- OFF Position
S901 : Push Switch (POWER)---------------------- OFF Position
S902 : Seesaw Switch(4Ω/8Ω)-------------------- 8Ω Position
(Impedance)

2)

All resistance values are indicated in ohms.
All resistors are carbon film 1/4W, ±5% unless.
All capacitance values are indicated in micrfarads. $P = \frac{1}{10^{12}}$
Electrolytic capacitor indicates ☐/☐
Working Voltage(V)
Capacitance (μF)

▨ Lch Signal Path
▨ Rch Signal Path

☐ ---→ 4Ω in Speker Impedance Selector Switch
☐ —→ 8Ω in Speker Impedance Selector Switch

Figure 29

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

10. EXPLODED VIEW (CABINET)

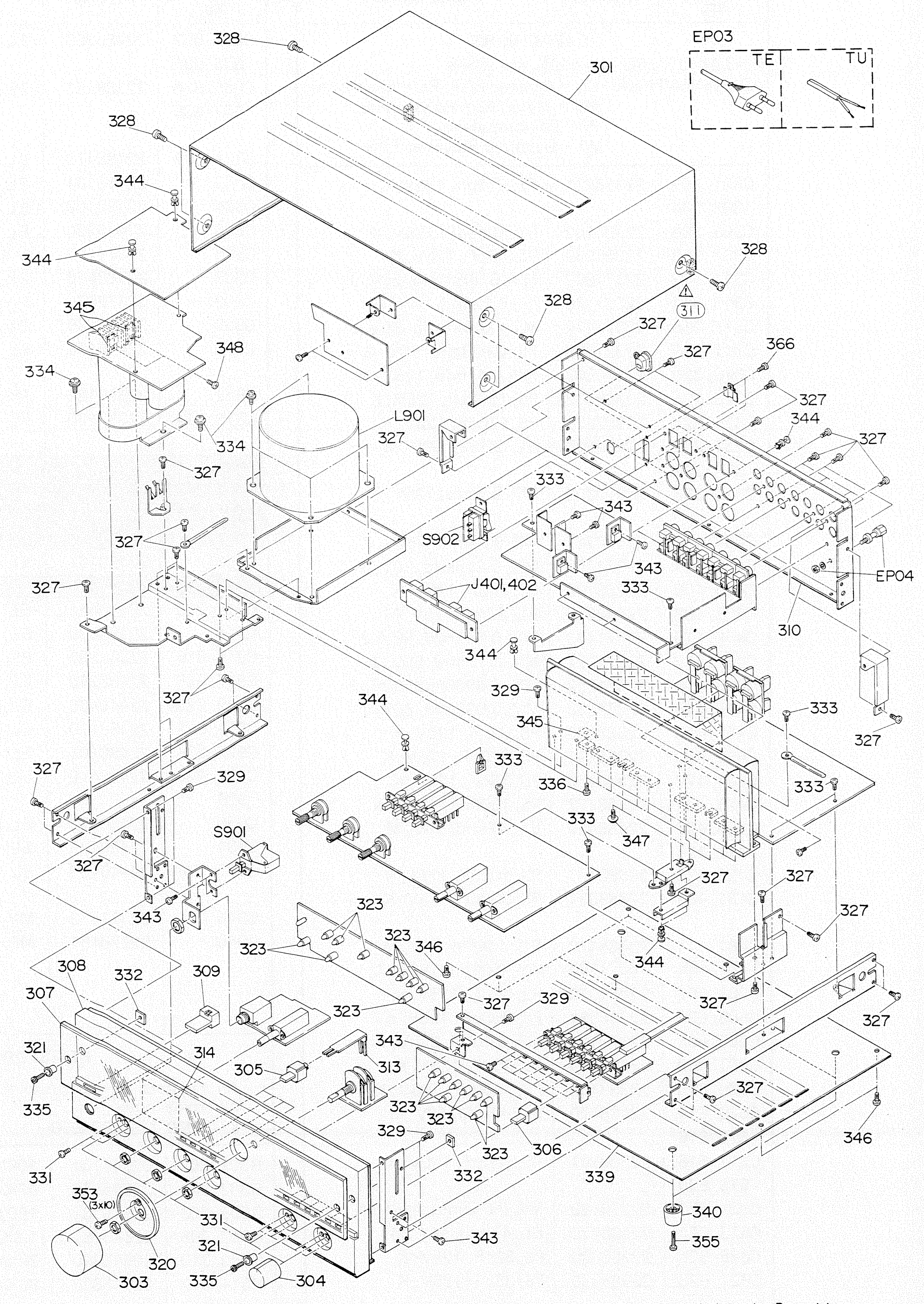

328
328
301
EP03
TE
TU
344
344
328
328
345
348
327
311
327
366
334
L901
327
327
344
334
327
327
333
343
S902
343
333
J401, 402
EP04
327
327
310
344
329
344
345
333
327
327
329
333
336
333
S901
347
327
327
327
343
323
323
346
308
332
309
344
307
323
327
329
327
327
321
314
343
305
313
335
323
323
327
329
323
306
346
331
332
339
353
(3×10)
331
340
321
355
343
320
303
335
304

Figure 30

NOTE: Parts excluded in the Parts List are not available as replacement parts.

11. PARTS LIST

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replace only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part No.	Description
	CABINET PARTS	
301	22841247	Cover, Top
303	22826329	Knob, Volume
304	22826328	Knob, Tone
305	25837472	Knob, Push
306	22824361	Knob, Push
307	22830179	Front Glass
308	22825026	Panel Ass'y, Front
309	22824354	Knob, Power
310	22714099	Plate, Jack (TE)
310	22714104	Plate, Jack (TU)
⚠ 311	25845528	Bush, Cord
314	22866180	Sheet, Color
320	22833545	Ring, Volume
321	22833517	Bushing, Panel
323	20022213	Holder, Lamp
327	22701326	Screw (BID), 3φ x 8mm, Tapping
328	22707062	Screw (FTBID), 4φ x 10mm, BLK
329	22707165	Screw (BID), 3φ x 10mm
331	22701394	Screw (PAN), 3φ x 8mm, BLK
332	22702179	Nut, Plate
333	22707115	Screw (BID), 3φ x 8mm, Tapping
334	22707196	Screw (FLFTPAN), 4φ x 8mm, BLK
335	22707660	Screw, 3φ x 10mm, Special
336	22707163	Screw (BID), 3φ x 10mm
340	22874043	Foot, A
343	22707066	Screw (BID), 3φ x 6mm
344	22705022	Rivet, Plastic, 3φ x 5.5mm
345	22756447	Washer
346	22707490	Screw (BID), 3φ x 8mm, Tapping, Chrome
347	22701434	Screw (TPAN), 3φ x 8mm
348	22707327	Screw (BID), 3φ x 8mm, Tapping, Chrome
355	22707276	Screw (BID), 3φ x 16mm, Tapping

Symbol No.	Part No.	Description
	TRANSISTORS, IC'S AND DIODES	
Q301, 302		Transistor, 2SK146-BL
Q303, 304	22114920	Transistor, μPA74V-E
Q305, 306	22114921	Transistor, μPA75V-E
Q307, 308 309, 310		Transistor, 2SA1145-Y
Q311, 312		Transistor, 2SC2705-Y
Q313, 314		Transistor, 2SC2238B-Y
Q315, 316		Transistor, 2SA968B-Y
Q317, 318		Transistor, 2SK117-GR4
Q319, 320 321, 322		Transistor, 2SC2240-BL
Q401, 402 403, 404		Transistor, 2SC2240-BL
Q405, 406		Transistor, 2SA970-BL
Q407, 408		Transistor, 2SC2240-BL
Q409, 410		Transistor, 2SC1627A-Y
Q411, 412		Transistor, 2SA817A-Y
Q413	22114922	IC, LF353N
Q601, 602		Transistor, 2SK150A-BL
Q603, 604	22114920	Transistor, μPA74V-E
Q605, 606		Transistor, 2SC2240-BL
Q607, 608	22114921	Transistor, μPA75V-E
Q609, 610 611, 612		Transistor, 2SA1145-Y
Q613, 614		Transistor, 2SC2705-Y
Q615, 616		Transistor, 2SA970-BL
Q617, 618 619, 620		Transistor, 2SC2240-BL
Q621, 622		Transistor, 2SA970-BL
Q623, 624		Transistor, 2SC2238B-Y
Q625, 626		Transistor, 2SA968B-Y
Q627, 628		Transistor, 2SC2565A-Y
Q629, 630		Transistor, 2SA1095A-Y
Q801, 802		Transistor, 2SC2240-BL
Q803		Transistor, 2SA1145-Y
Q804		Transistor, 2SA970-BL
Q805, 806		Transistor, 2SA817A-Y
Q807		IC, TA7317P
Q808, 809 810		Transistor, 2SK150A-Y
Q811		Transistor, 2SA1145-Y
Q812		Transistor, 2SC2705-Y
Q813		Transistor, 2SK117-GR
Q814		Transistor, 2SA970-BL
Q815, 816		Transistor, 2SC2240-BL

Symbol No.	Part No.	Description
Q901, 902		Transistor, 2SK117-Y
Q903, 904		Transistor, 2SC2240-BL
Q905, 906		Transistor, 2SC2238B-Y
Q907, 908		Transistor, 2SK117-GR
Q909, 910		Transistor, 2SA968B-Y
Q911, 912		Transistor, 2SC2240-BL
Q913		Transistor, 2SK117-GR
Q914		Transistor, 2SD880-Y
Q915		Transistor, 2SA970-BL
D301, 302		Diode, 1S1555V
D401, 402		Diode, 1S1555V
D601, 602		Diode, 1S1555V
D603, 604	22115424	Diode, STV-4H
D605, 606		Diode, 1S1555V
D607, 608		Diode, 1S2462
609, 610		
D801, 802		Diode, 1S1553V
D803, 804		Diode, S5277D
805		
D806		Diode, 1S1555V
D807, 808		Diode, 1S1553V
809, 810		
D813		Diode, 05Z15
D814		Diode, 1S1555V
D815		Diode, 05Z33
⚠ D901		Diode, 2GG2Z41
⚠ D902		Diode, 2GG2C41
⚠ D903		Diode, 5DG2Z41
⚠ D904		Diode, 5DG2C41
⚠ D905		Diode, 1D2C1
⚠ D906		Diode, 1D2Z1
D907	22115676	Diode, HZ6L-C-3
D908, 909	22115675	Diode, HZ20L-2
910, 911		
D912		Diode, 02Z12A
D913, 914		Diode, 05Z15
D915		Diode, 02Z7.5A
D916		Diode, 1D2C1
ELECTRICAL PARTS		
L601, 602	22210107	Coil, 1μH
⚠ L901	22223990	Transformer, Power

Symbol No.	Part No.	Description
S301	22195786	Switch, Remote, MC/MM
S302, 303	22195779	Switch, Push, Function
S304, 305		MC/MM, PHONO, TUNER,
306, 307		AUX,
		TAPE 1, TAPE 2
S401, 402	22195778	Switch, Push, DIRECT,
403, 404		LOUDNESS, SUBSONIC,
		MUTING
S405	22195776	Switch, Rotary, MODE
S406	22195777	Switch, Rotary, REC
		SELECTOR
⚠ S601, 602	22148667	Relay, Speaker
S801	22195846	Switch, Rotary, SPEAKERS
⚠ S901	22195835	Switch, Push, Power
⚠ S902	22195716	Switch, Seesaw, Voltage
		Select (impedance)
J301	22163848	Jack, US2P
J302, 303	22163831	Jack, US4P
304		
J401, 402	22162476	Terminal, 2P, CLEAN DRIVE
J601	22163665	Jack, Headphone
J602, 603	22162470	Terminal, 4P, SPEAKER
⚠ F901	22144337	Fuse, T 1A/250V
⚠ F902, 903	22144407	Fuse, T 315mA/250V
⚠ F904, 905	22144291	Fuse, T 6.3A/250V
⚠ F906, 907	22144407	Fuse, T 315mA/250V
N901, 902	22113519	Lamp, 14V, 50mA
903, 904		
905, 906		
907, 908		
909, 910		
911, 912		
913, 914		
915, 916		
917, 918		
919		
EP01	22195802	Remote Wire, 2P
EP02	22165047	Holder, Fuse
⚠ EP03	22176286	Cord, Power (TE)
⚠ EP03	22176628	Cord, Power (TU)
EP04	22162327	Terminal, Ground

Symbol No.	Part No.	Description
CAPACITORS G = ±2%, J = ±5%, K = ±10%, M = ±20% ABBREVIATIONS: CD = Ceramic Disk, EL = Electrolytic, MY = Mylar, PS = Polystyrene, PP = Polypropylene MP = Metalized Polyester Film		
C301, 302	22388271	PS, 270pF, 125V, K
303, 304		
C305, 306	22388102	PS, 1000pF, 125V, K
C307, 308	22388330	PS, 33pF, 125V, K
C311, 312	22371822	MY, 0.0082mfd, 50V, J
C313, 314	22321168	PP, 0.12mfd, 50V, G
C315, 316	22371472	MY, 0.0047mfd, 50V, J
C317, 318	22321169	PP, 0.033mfd, 50V, G
C319, 320	22370302	MP, 0.47mfd, 125V, K
C323, 324	22388152	PS, 1500pF, 125V, K
C325, 326	22388471	PS, 470pF, 125V, K
C331, 332	22488220	EL, 22mfd, 50V, M
333, 334		
C335, 336	22370292	MP, 2.2mfd, 125V, K
C401, 402	22370227	MP, 0.22mfd, 250V, J
C403, 404	22371153	MY, 0.015mfd, 50V, J
C405, 406	22388100	PS, 10pF, 125V, K
C407, 408	22486220	EL, 22mfd, 25V, M
C409, 410	22371473	MY, 0.047mfd, 50V, J
C411, 412	22371224	MY, 0.22mfd, 50V, J
C413, 414	22371682	MY, 0.0068mfd, 50V, J
C415, 416	22371333	MY, 0.033mfd, 50V, J
C417, 418	22388330	PS, 33pF, 125V, K
C419, 420	22388391	PS, 390pF, 125V, K
C421, 422	22388150	PS, 15pF, 125V, K
C423, 424	22388152	PS, 1500pF, 125V, K
C425, 426	22488470	EL, 47mfd, 50V, M
427, 428		
C429, 430	22388101	PS, 100pF, 125V, K
C431, 432	22388331	PS, 330pF, 125V, K
C481	22488479	EL, 4.9mfd, 50V, M
C497, 498	22371103	MY, 0.01mfd, 50V, J
C601, 602	22388330	PS, 33pF, 125V, K
C603, 604	22388391	PS, 390pF, 125V, K
C605, 606	22370186	MP, 0.1mfd, 250V, K
C607, 608	22388150	PS, 15pF, 125V, K
C609, 610	22388102	PS, 1000pF, 125V, K
C613, 614	22488470	EL, 47mfd, 50V, M
615, 616		
C617, 618	22388101	PS, 100pF, 125V, K
619, 620		
C621, 622	22370189	MP, 0.047mfd, 400V, K
C623, 624	22488470	EL, 47mfd, 50V, M
C625, 626	22388820	PS, 82pF, 125V, K
C627, 628	22388330	PS, 33pF, 125V, K

Symbol No.	Part No.	Description
C631, 632	22488330	EL, 33mfd, 50V, M
633, 634		
C635, 636	22388221	PS, 220pF, 125V, K
637, 638		
C801, 802	22488479	EL, 4.7mfd, 50V, M
C803	22483101	EL, 100mfd, 10V, M
C804	22488100	EL, 10mfd, 50V, M
C805	22486220	EL, 22mfd, 25V, M
C806	22371103	MY, 0.01mfd, 50V, K
C807	22488478	EL, 0.47mfd, 50V, M
C808	22372472	MY, 0.0047mfd, 50V, K
C809	22485330	EL, 33mfd, 16V, M
C810	22485470	EL, 47mfd, 16V, M
C812	22370181	MP, 0.01mfd, 630V, K
C813, 814	22388100	PS, 10pF, 125V, K
⚠ C901	22340150	CD, 4700pF, 400V
⚠ C902, 903	22370181	MP, 0.01mfd, 630V, K
904, 905		
⚠ C906, 907	22440438	EL, 15000mfd, 63V, M
C908	22488101	EL, 100mfd, 50V, M
⚠ C910, 911	22440435	EL, 470mfd, 100V, M
C912, 913	22440434	EL, 47mfd, 100V, M
C914	22488470	EL, 47mfd, 50V, M
C915, 916	22388330	PS, 33pF, 125V, K
C917, 918	22488220	EL, 22mfd, 50V, M
C919, 920	22440436	EL, 100mfd, 100V, M
C921, 922	22488470	EL, 47mfd, 50V, M
C923, 924	22488101	EL, 100mfd, 50V, M
C927, 928	22488470	EL, 47mfd, 50V, M
929		
C930	22486222	EL, 2200mfd, 25V, M
C931	22486470	EL, 47mfd, 25V, M
C933, 934	22440436	EL, 100mfd, 100V, M
C945	22371473	MY, 0.047mfd, 50V, J
C948	22370181	MP, 0.01mfd, 630V, K
RESISTORS All resistors are carbon film ¼W, ±5%, unless otherwise noted. K = 1000, M = 1000000		
R301, 302	22545101	100 ohm
R303, 304	22545473	47K ohm
R305, 306	22545181	180 ohm
R307, 308	22545182	1.8K ohm
R309, 310	22545390	39 ohm
R311, 312	22545823	82K ohm

Symbol No.	Part No.	Description
R313, 314	22545222	2.2K ohm
R315, 316	22545562	5.6K ohm
R317, 318	22545822	8.2K ohm
R319, 320	22540557	3.6 ohm, ±2%
R321, 322	22545330	33 ohm
R323, 324	22545821	820 ohm
R325, 326	22545153	15K ohm
R327, 328	22545154	150K ohm
R329, 330	22555153	15K ohm
R331, 332 333, 334	22555122	1.2K ohm
R335, 336	22555561	560 ohm
⚠ R337, 338 339, 340	22500282	22 ohm, Fusible
R341, 342	22540463	22K ohm, ±1%
R343, 344	22555222	2.2K ohm
R345, 346	22540155	2.2K ohm, ±1%
R347, 348	22555223	22K ohm
R349, 350	22545565	5.6M ohm
R351	22545683	68K ohm
R352	22555683	68K ohm
R353, 354	22545471	470 ohm
R355, 356	22545561	560 ohm
R357, 358	22658586	4.7K ohm, Semi-fixed Variable
R359, 360	22545392	3.9K ohm
R361, 362	22545104	100K ohm
R363, 364	22545271	270 ohm
R401, 402	22545563	56K ohm
R403, 404	22545682	6.8K ohm
R405, 406	22555183	18K ohm
R407, 408	22545182	1.8K ohm
R409, 410 411, 412	22545103	10K ohm
R413, 414	22545152	1.5K ohm
R415, 416	22545473	47K ohm
R417, 418	22545103	10K ohm
R419	22545222	2.2K ohm
R420	22555222	2.2K ohm
R421, 422	22545471	470 ohm
R423	22620028	250K ohm, MN, Variable, Balance
R424	22651555	100K ohm, B, Variable, Volume
R425, 426	22651554	50K ohm, A, Variable, Bass/Treble
R427, 428	22545472	4.7K ohm
R429, 430 431, 432 433, 434 435, 436	22545474	470K ohm
R437, 438 439, 440	22545182	1.8K ohm

Symbol No.	Part No.	Description
R441, 442	22547183	18K ohm, ½W
R443, 444	22545273	27K ohm
R445, 446	22545102	1K ohm
R447, 448	22545821	820 ohm
R449, 450	22545391	390 ohm
R451, 452	22545822	8.2K ohm
R453, 454	22545472	4.7K ohm
R455, 456	22545102	1K ohm
⚠ R457, 458 459, 460	22500178	39 ohm, Fusible
R461, 462	22545472	4.7K ohm
R463, 464	22545223	22K ohm
R465, 466	22545123	12K ohm
R467, 468	22545474	470K ohm
R601, 602	22545124	120K ohm
R603, 604	22555471	470 ohm
R605, 606	22555472	4.7K ohm
R607, 608	22555152	1.5K ohm
R609, 610	22555472	4.7K ohm
R611, 612	22555332	3.3K ohm
R613, 614	22555102	1K ohm
R615, 616	22555104	100K ohm
R617, 618	22555223	22K ohm
R619, 620 621, 622	22555102	1K ohm
R623, 624 625, 626	22555331	330 ohm
R627, 628	22545153	15K ohm
R629, 630	22555221	220 ohm
R631, 632	22555472	4.7K ohm
R633, 634	22555124	120K ohm
R635, 636	22545123	12K ohm
R637, 638	22545473	47K ohm
R639, 640	22545391	390 ohm
R641, 642	22555391	390 ohm
R645, 646 647, 648	22555561	560 ohm
⚠ R649, 650 651, 652	22500182	390 ohm, Fusible
R653, 654	22555181	180 ohm
R655, 656	22658260	470 ohm, Semi-fixed Variable
R657, 658	22555102	1K ohm
R659, 660 661, 662	22555471	470 ohm
R663, 664 665	22555152	1.5K ohm
R666	22545152	1.5K ohm
⚠ R667, 668 669, 670	22500168	3.3 ohm, Fusible
⚠ R671, 672	22500178	39 ohm, Fusible
⚠ R673, 674 675, 676	22500087	0.22 ohm, 5W, Wire Wound

Symbol No.	Part No.	Description
R677, 678	22570359	4.7 ohm, 2W, Metal Film
R679, 680	22570250	10 ohm, 1W, Metal Oxided Film
R681, 682	22570311	220 ohm, 2W, Metal Oxided Film
R801, 802	22555122	1.2K ohm
R803, 804	22555123	12K ohm
R805	22555182	1.8K ohm
R806	22555104	100K ohm
R807	22555124	120K ohm
R808	22545222	2.2K ohm
R809	22555562	5.6K ohm
R810	22555183	18K ohm
R811, 812	22545683	68K ohm
R813	22555393	39K ohm
R814	22555273	27K ohm
R815	22555473	47K ohm
R816	22555334	330K ohm
R817	22545183	18K ohm
R818	22555222	2.2K ohm
R819	22555333	33K ohm
R820	22555563	56K ohm
R821	22570316	560 ohm, 2W, Metal Oxided Film
R822	22545473	47K ohm
R823	22555122	1.2K ohm
R824	22555683	68K ohm
R825	22545473	47K ohm
R826	22545103	10K ohm
R827	22545223	22K ohm
R828	22545104	100K ohm
R829, 830	22545474	470K ohm
R831, 832	22555470	47 ohm
R833	22545473	47K ohm
R834	22555473	47K ohm
R835	22545331	330 ohm
R836	22555331	330 ohm
R837, 838 839, 840	33555123	12K ohm
R841, 842	22555222	2.2K ohm
R843, 844	22545103	10K ohm
R845, 846	22545102	1K ohm
R847	22545473	47K ohm
R848	22545222	2.2K ohm
R849	22540556	220M ohm, ±10%
R850	22555223	22K ohm
R851, 852	22555103	10K ohm
R853	22545183	18K ohm
R854	22545333	33K ohm
R855	22545124	120K ohm
R856	22570278	2.2K ohm, 1W, Metal Oxided Film
R858	22545682	6.8K ohm

Symbol No.	Part No.	Description
R859	22570316	560 ohm, 2W, Metal Oxided Film
⚠ R901	22500120	560 ohm, Fusible
⚠ R902	22500299	560 ohm, Fusible
R903	22545223	22K ohm
R904	22555272	2.7K ohm
R905	22555391	390 ohm
R906	22545822	8.2K ohm
R907	22545102	1K ohm
R908, 909	22545473	47K ohm
R910	22545102	1K ohm
R911	22555102	1K ohm
⚠ R912	22500201	1 ohm, ½W, Fusible
R913, 914	22570281	3.9K ohm, 1W, Metal Oxided Film
R915, 916	22555561	560 ohm
R917, 918	22555183	18K ohm
R919, 920	22658453	2.2K ohm, Semi-fixed Variable
R921	22570281	3.9K ohm, 1W, Metal Oxided Film

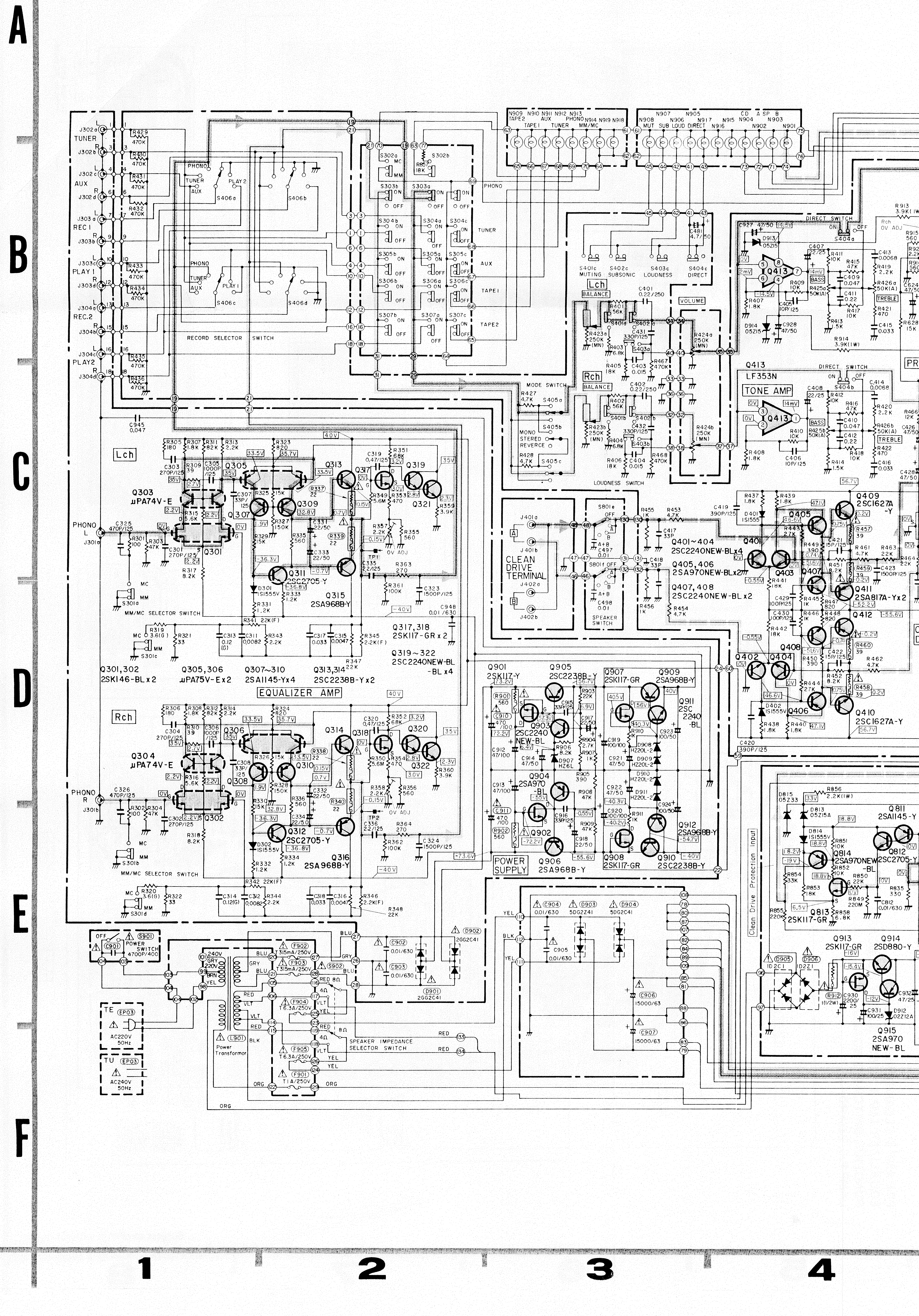
ACCESSORIES

Symbol No.	Part No.	Description
AC01	22170438	Cord, CLEAN DRIVE (BLK)
AC02	22170439	Cord, CLEAN DRIVE (GRY)
AC03	22903040	Owner's Manual
AC04	22162479	Terminal, CLEAN DRIVE
AC05	22701230	Screw (WRUD), 3.1ϕ x 10mm

SB-77

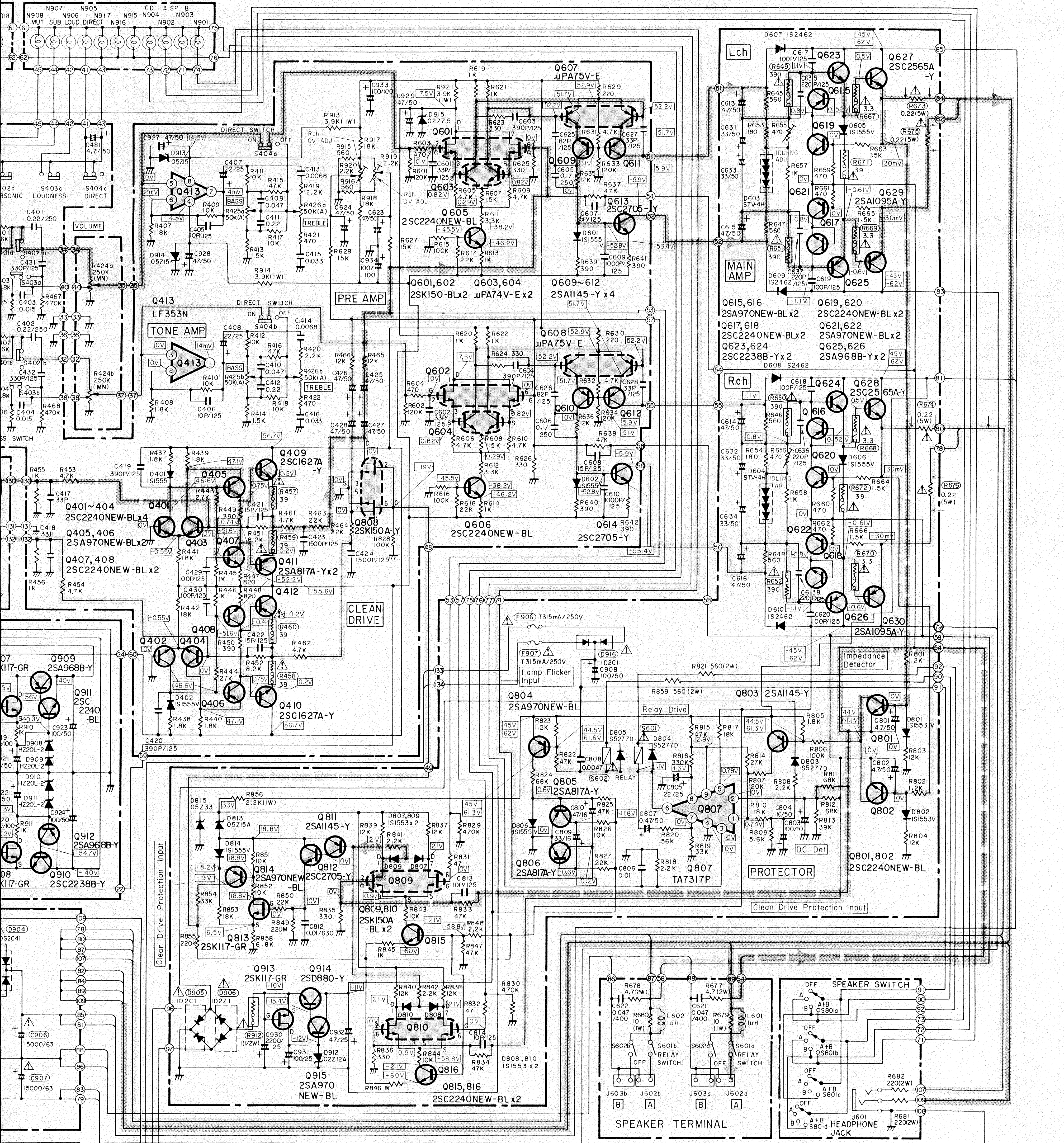
SCHEMATIC

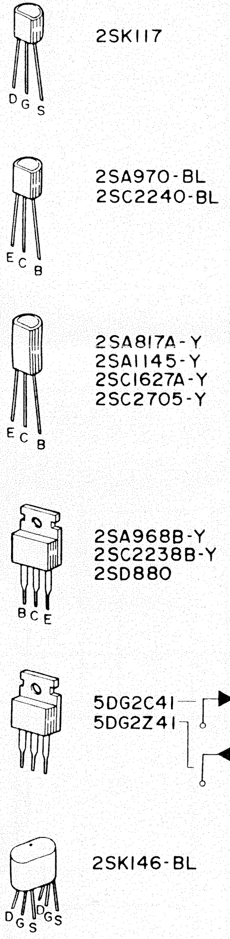
CAUTION:
The ⚠ mark, the symbol No. circluled with rectar
designate components which have special characteristi
identical to those in the original circuit or specified in th


1
2
3
4
A
B
C
D
E
F
TUNER
AUX
REC 1
PLAY 1
REC.2
PLAY2
RECORD SELECTOR SWITCH
PHONO
TAPE1
TAPE2
MODE SWITCH
MONO
STEREO
REVERSE
LOUDNESS SWITCH
S401c MUTING
S402c SUBSONIC
S403c LOUDNESS
S404c DIRECT
Lch
Rch
BALANCE
VOLUME
Q413 LF353N
TONE AMP
BASS
TREBLE
DIRECT SWITCH
Rch OV ADJ
CLEAN DRIVE TERMINAL
SPEAKER SWITCH
Q401~404 2SC2240NEW-BLx4
Q405,406 2SA970NEW-BLx2
Q407,408 2SC2240NEW-BL x2
Q409 2SC1627A-Y
Q410 2SC1627A-Y
Q411 2SA817A-Yx2
Q303 μPA74V-E
Q304 μPA74V-E
Q311 2SC2705-Y
Q312 2SC2705-Y
Q315 2SA968B-Y
Q316 2SA968B-Y
Q317,318 2SK117-GR x 2
Q319~322 2SC2240NEW-BL -BL x4
Q301,302 2SK146-BL x 2
Q305,306 μPA75V-E x2
Q307~310 2SA1145-Yx4
Q313,314 2SC2238B-Y x2
EQUALIZER AMP
PHONO L J301a
PHONO R J301b
MM/MC SELECTOR SWITCH
OV ADJ
Q901 2SK117-Y
Q905 2SC2238B-Y
Q907 2SK117-GR
Q909 2SA968B-Y
Q903 2SC2240 NEW-BL
Q904 2SA970 -BL
Q911 2SC 2240 -BL
Q912 2SA968B-Y
Q902
Q906 2SA968B-Y
Q908 2SK117-GR
Q910 2SC2238B-Y
POWER SUPPLY
Q811 2SA1145-Y
Q812 2SC2705-Y
Q814 2SA970NEW -BL
Q813 2SK117-GR
Clean Drive Protection input
Q913 2SK117-GR
Q914 2SD880-Y
Q915 2SA970 NEW-BL
S901 POWER SWITCH 4700P/400
L901 Power Transformer
SPEAKER IMPEDANCE SELECTOR SWITCH
TE EP03 AC220V 50Hz
TU EP03 AC240V 50Hz
C904 0.01/630
D903 5DG2Z41
D904 5DG2C41
C905 0.01/630
C906 15000/63
C907 15000/63
F902 315mA/250V
F903 315mA/250V
F904 T6.3A/250V
F905 T6.3A/250V
F901 T1A/250V
D901 2GG2C41
D902 2GG2C41
YEL
BLK
BLU
GRY
BRN
RED
VLT
ORG

■SCHEMATIC DIAGRAM(MAIN)

UTION:
e ⚠ mark, the symbol No. circluled with rectangle in the schematic diagram and the shaded area in the parts list signate components which have special characteristics important for safety and should be replaced only with types ntical to those in the original circuit or specified in the parts list.


N907 N905 CD A SP B
N908 MUT SUB LOUD DIRECT N917 N915 N904 N903
N906 N916 N902 N901
DIRECT SWITCH
S404a
S403c LOUDNESS
S404c DIRECT
VOLUME
Q413
LF353N
TONE AMP
BASS
TREBLE
S404b
PRE AMP
Q601,602 2SK150-BLx2
Q603,604 μPA74V-Ex2
Q609~612 2SA1145-Y x4
Q607 μPA75V-E
Q608 μPA75V-E
Q605 2SC2240NEW-BL
Q606 2SC2240NEW-BL
Q613 2SC2705-Y
Q614 2SC2705-Y
Q401~404 2SC2240NEW-BLx4
Q405,406 2SA970NEW-BLx2
Q407,408 2SC2240NEW-BL x2
Q409 2SC1627A-Y
Q410 2SC1627A-Y
Q411 2SA817A-Yx2
Q412
Q808 2SK150A-Y
CLEAN DRIVE
Lch
Rch
MAIN AMP
Q615,616 2SA970NEW-BL x2
Q617,618 2SC2240NEW-BLx2
Q619,620 2SC2240NEW-BL x2
Q621,622 2SA970NEW-BL x2
Q623,624 2SC2238B-Yx2
Q625,626 2SA968B-Yx2
Q627 2SC2565A-Y
Q628 2SC2565A-Y
Q629 2SA1095A-Y
Q630 2SA1095A-Y
Impedance Detector
F906 T315mA/250V
F907 T315mA/250V
Lamp Flicker Input
Relay Drive
RELAY
Q803 2SA1145-Y
Q804 2SA970NEW-BL
Q805 2SA817A-Y
Q806 2SA817A-Y
Q807 TA7317P
Q801,802 2SC2240NEW-BL
DC Det
PROTECTOR
Clean Drive Protection Input
Q811 2SA1145-Y
Q812 2SC2705-Y
Q813 2SK117-GR
Q814 2SA970NEW-BL
Q809,810 2SK150A-BL x2
Q815,816 2SC2240NEW-BLx2
Q913 2SK117-GR
Q914 2SD880-Y
Q915 2SA970 NEW-BL
Q909 2SA968B-Y
Q910 2SC2238B-Y
Q911 2SC2240-BL
Q912 2SA968B-Y
SPEAKER TERMINAL
SPEAKER SWITCH
S601a RELAY SWITCH
S601b RELAY SWITCH
J601 HEADPHONE JACK


2SK117
D G S
2SA970-BL
2SC2240-BL
E C B
2SA817A-Y
2SA1145-Y
2SC1627A-Y
2SC2705-Y
E C B
2SA968B-Y
2SC2238B-Y
2SD880
B C E
5DG2C41
5DG2Z41
2SK146-BL
D G S D G S

1)
S301 : Cartridge Select
S302 : Push Switch(MM/
S303 : Push Switch(PHON
S304 : Push Switch(TUNE
S305 : Push Switch(AUX)
S306 : Push Switch(TAPE
S307 : Push Switch(TAPE
S401 : Push Switch(MUT
S402 : Push Switch(SUBS
S403 : Push Switch(LOUD
S404 : Push Switch(DIRE
S405 : Selector Switch(M
S406 : Selector Switch(R
S601 : Relay Switch (SP
S602 : Relay Switch (SP
S801 : Speaker Select S
S901 : Push Switch (PO
S902 : Seesaw Switch(4
(Impedance)

2)
All resistance values a
All resistors are carbo
All capacitance values
Electrolytic capacitor i

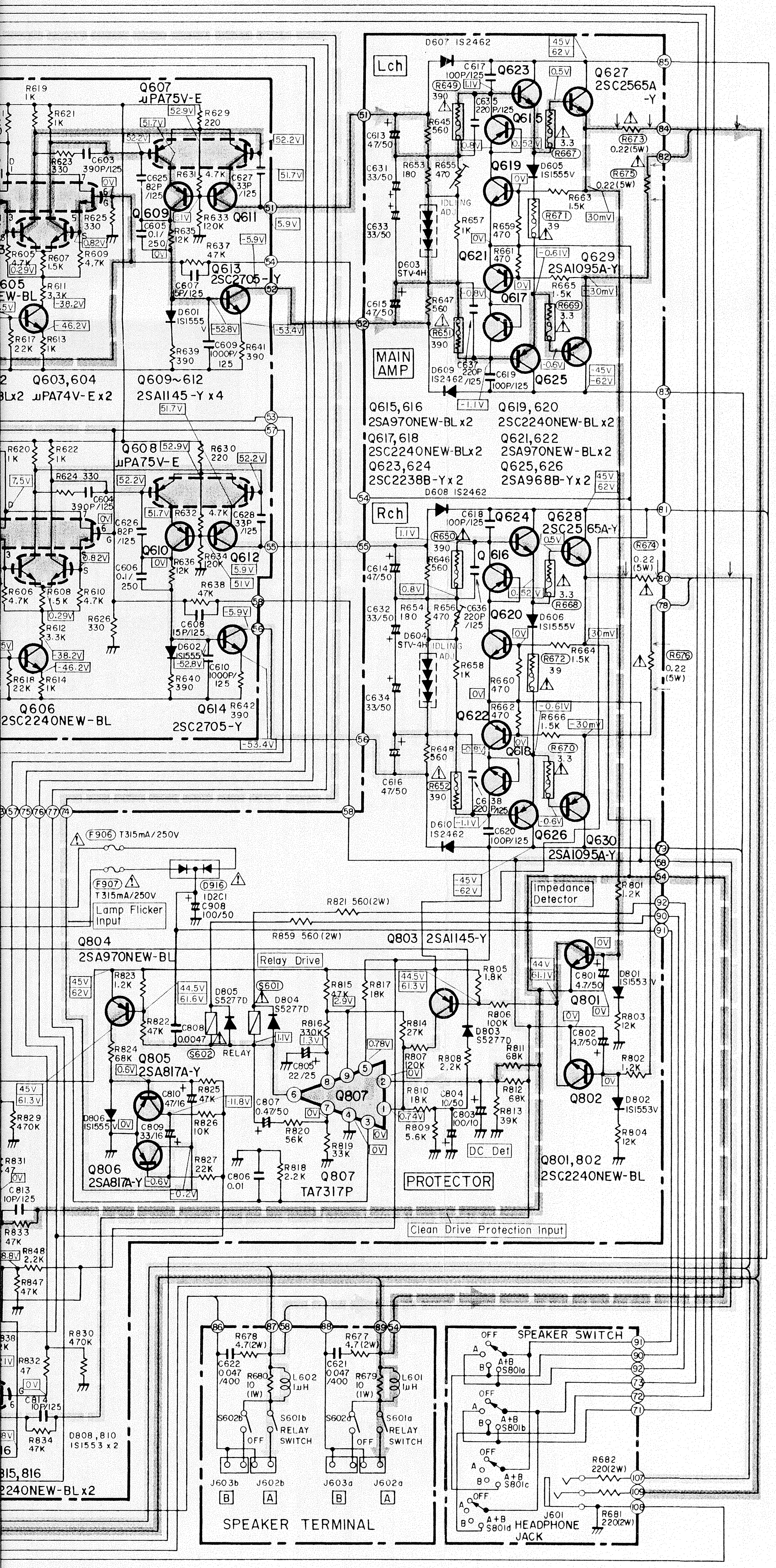
▨ Lch Signal
▨ Rch Signal

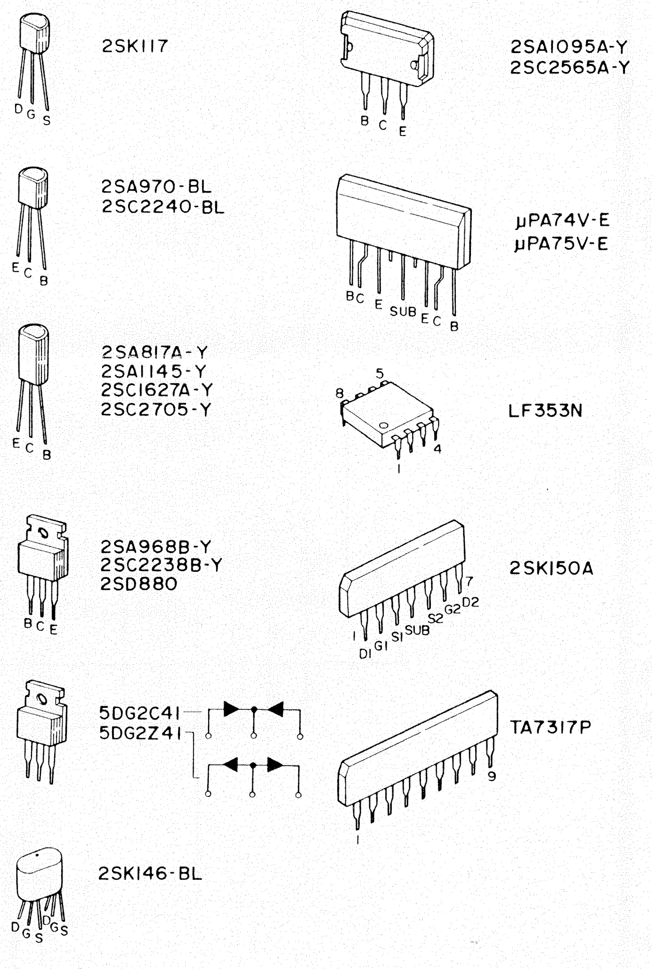
☐ → 4Ω in Speker I
☐ → 8Ω in Speker I

Subject to change without notice.

AM(MAIN)

matic diagram and the shaded area in the parts list
or safety and should be replaced only with types


Lch
Rch
MAIN AMP
Q607 μPA75V-E
Q608 μPA75V-E
Q609
Q610
Q611
Q612
Q613 2SC2705-Y
Q614 2SC2705-Y
Q603,604 μPA74V-E x2
Q609~612 2SA1145-Y x4
Q606 2SC2240NEW-BL
Q615,616 2SA970NEW-BL x2
Q617,618 2SC2240NEW-BLx2
Q619,620 2SC2240NEW-BL x2
Q621,622 2SA970NEW-BLx2
Q623,624 2SC2238B-Y x2
Q625,626 2SA968B-Y x2
Q627 2SC2565A-Y
Q628 2SC2565A-Y
Q629 2SA1095A-Y
Q630 2SA1095A-Y
D603 STV-4H
D604 STV-4H
IDLING ADJ.
D607 IS2462
D608 IS2462
D609 IS2462
D610 IS2462
D605 IS1555V
D606 IS1555V
D601 IS1555
D602 IS1555
R673 0.22(5W)
R675 0.22(5W)
R674 0.22(5W)
R676 0.22(5W)
F906 T315mA/250V
F907 T315mA/250V
Lamp Flicker Input
D916 102C1
C908 100/50
R821 560(2W)
R859 560(2W)
Q803 2SA1145-Y
Q804 2SA970NEW-BL
Relay Drive
Impedance Detector
Q805 2SA817A-Y
Q806 2SA817A-Y
Q807 TA7317P
Q801
Q802
Q801,802 2SC2240NEW-BL
D805 S5277D
D804 S5277D
D803 S5277D
D801 IS1553V
D802 IS1553V
D806 IS1555V
D808,810 IS1553 x2
RELAY
DC Det
PROTECTOR
Clean Drive Protection Input
Q815,816 2SC2240NEW-BL x2
R678 4.7(2W)
R677 4.7(2W)
R680 10 (1W)
R679 10 (1W)
L602 1μH
L601 1μH
S601b RELAY SWITCH
S601a RELAY SWITCH
S602b
S602a
OFF
J603b
J602b
J603a
J602a
B
A
SPEAKER TERMINAL
SPEAKER SWITCH
S801a
S801b
S801c
S801d
A+B
R682 220(2W)
R681 220(2W)
J601 HEADPHONE JACK


2SK117
D G S
2SA1095A-Y
2SC2565A-Y
B C E
2SA970-BL
2SC2240-BL
E C B
μPA74V-E
μPA75V-E
BC E SUB E C B
2SA817A-Y
2SA1145-Y
2SC1627A-Y
2SC2705-Y
E C B
LF353N
8
5
1
4
2SA968B-Y
2SC2238B-Y
2SD880
B C E
2SK150A
D1 G1 S1 SUB S2 G2 D2
7
5DG2C41
5DG2Z41
TA7317P
1
9
2SK146-BL
D G S D G S

1)

S301 : Cartridge Select Switch(MM/MC)------------- MM Position
S302 : Push Switch(MM/MC Lamp Select/Muting)--- OFF Position
S303 : Push Switch(PHONO)-------------------------- ON Position
S304 : Push Switch(TUNER)-------------------------- OFF Position
S305 : Push Switch(AUX)---------------------------- OFF Position
S306 : Push Switch(TAPE 1)------------------------- OFF Position
S307 : Push Switch(TAPE 2)------------------------- OFF Position
S401 : Push Switch(MUTING)------------------------- OFF Position
S402 : Push Switch(SUBSONIC)----------------------- OFF Position
S403 : Push Switch(LOUDNESS)----------------------- OFF Position
S404 : Push Switch(DIRECT)------------------------- ON Position
S405 : Selector Switch(MODE)----------------------- STEREO Position
S406 : Selector Switch(RECORD)--------------------- OFF Position
S601 : Relay Switch (SPEAKER)---------------------- OFF Position
S602 : Relay Switch (SPEAKER)---------------------- OFF Position
S801 : Speaker Select Switch(A/B)------------------ OFF Position
S901 : Push Switch (POWER)------------------------- OFF Position
S902 : Seesaw Switch(4Ω/8Ω)------------------------ 8Ω Position
(Impedance)

2)

All resistance values are indicated in ohms.
All resistors are carbon film 1/4W, ±5% unless.
All capacitance values are indicated in micrfarads. $P = \frac{1}{10^{12}}$
Electrolytic capacitor indicates ☐/☐

Working Voltage(V)
Capacitance (μF)

▨ Lch Signal Path

▨ Rch Signal Path

☐ → 4Ω in Speker Impedance Selector Switch
☐ → 8Ω in Speker Impedance Selector Switch

Subject to change without notice.

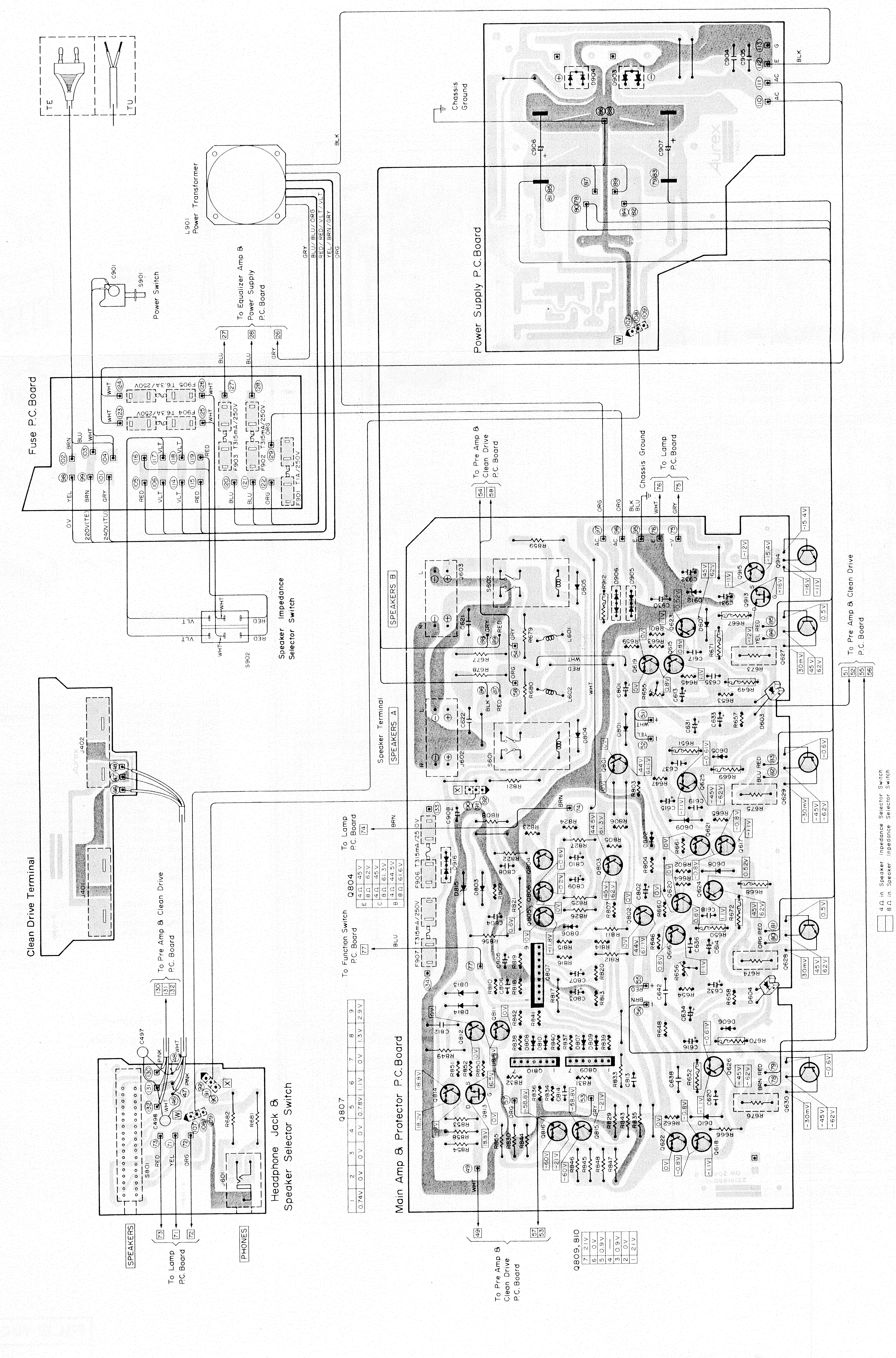
FILE NO. 171-135

SB-77 TE, TU

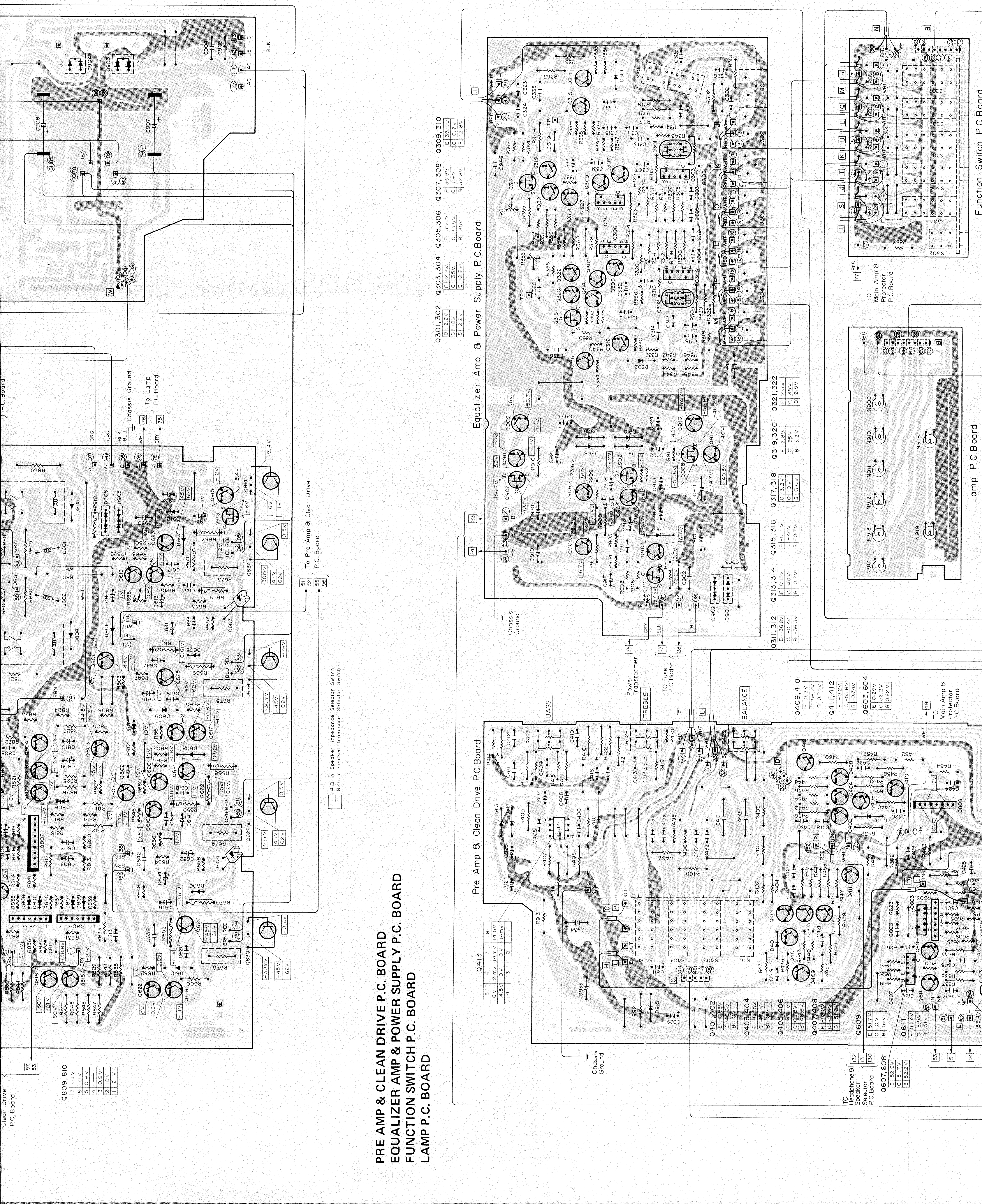
TOSHIBA PRINTED IN JAPAN
May.1981 Ⓢ

■ P.C. BOARD P

MAIN AMP & PROTECTOR P.C. BOARD
POWER SUPPLY P.C. BOARD
HEADPHONE JACK & SPEAKER SELECT SWITCH P.C. BOARD

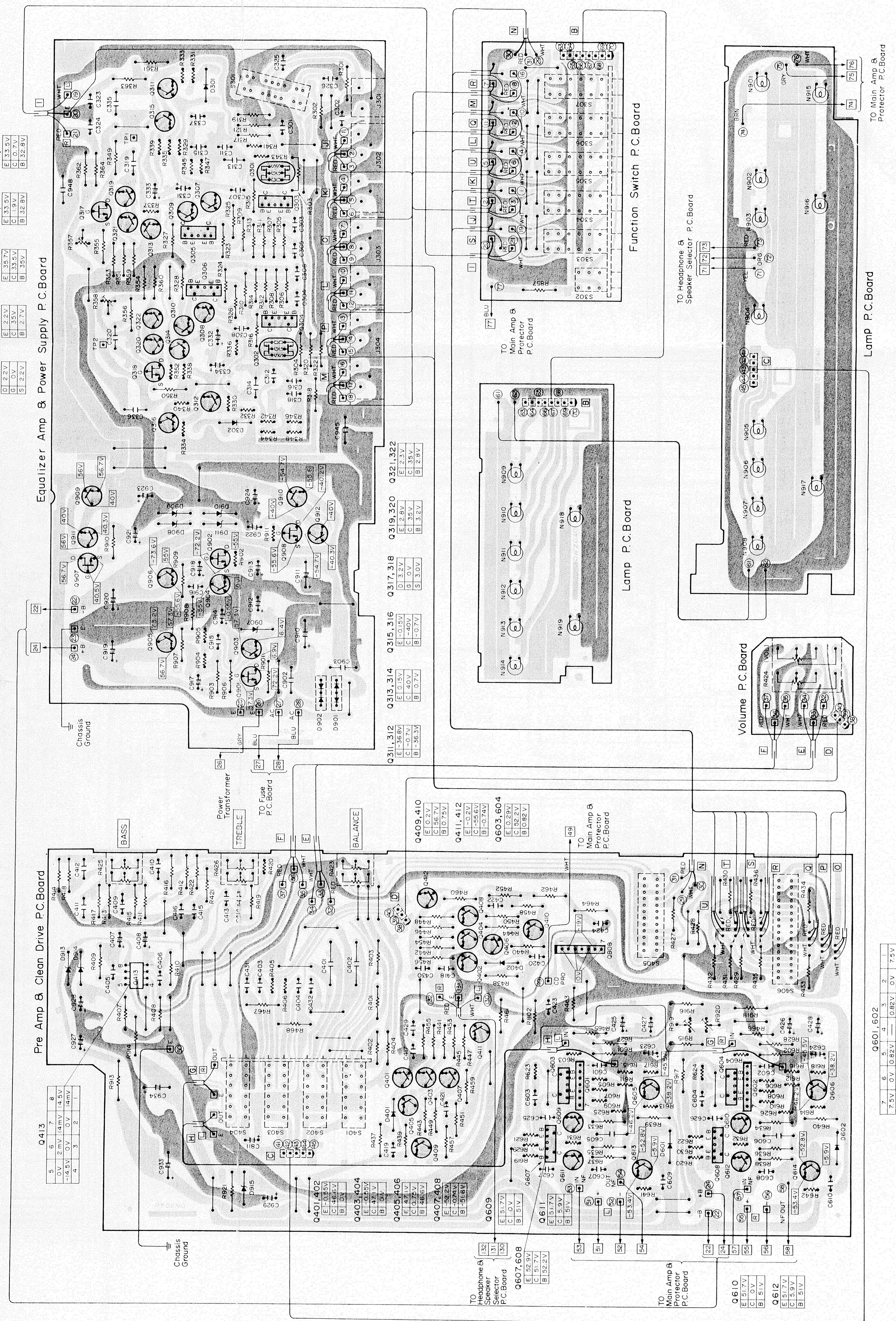

Power Supply P.C.Board
Chassis Ground
L901 Power Transformer
S901 Power Switch
C901
To Equalizer Amp & Power Supply P.C. Board
Fuse P.C.Board
F901 T1A/250V
F902 T315mA/250V
F903 T315mA/250V
F904 T6.3A/250V
F905 T6.3A/250V
220V(TE)
240V(TU)
TE
TU
S902 Speaker Impedance Selector Switch
Clean Drive Terminal
J401
J402
To Pre Amp & Clean Drive P.C. Board
Speaker Terminal
SPEAKERS A
SPEAKERS B
To Lamp P.C. Board
To Function Switch P.C. Board
Main Amp & Protector P.C.Board
Headphone Jack & Speaker Selector Switch
S801
J601
SPEAKERS
PHONES
F906 T315mA/250V
F907 T315mA/250V
Q804
Q807
Q809, 810
To Pre Amp & Clean Drive P.C. Board
4 Ω in Speaker Impedance Selector Switch
8 Ω in Speaker Impedance Selector Switch

■ P.C. BOARD PARTS LOCATIONS


Equalizer Amp & Power Supply P.C.Board
Pre Amp & Clean Drive P.C.Board
Function Switch P.C.Board
Lamp P.C.Board
To Pre Amp & Clean Drive P.C. Board
To Lamp P.C.Board
Chassis Ground
Power Transformer
TO Fuse P.C.Board
TO Main Amp & Protector P.C.Board
TO Headphone & Speaker Selector P.C.Board
4 Ω in Speaker Impedance Selector Switch
8 Ω in Speaker Impedance Selector Switch
BASS
TREBLE
BALANCE
Q301,302 D 2.2V G 0V S 2.2V
Q303,304 E 2.2V C 35V B 2.7V
Q305,306 E 35.7V C 33.5V B 35V
Q307,308 E 33.5V C 1.9V B 32.8V
Q309,310 E 33.5V C 0.7V B 32.8V
Q311,312 E -36.8V C -0.7V B -36.3V
Q313,314 E 0.15V C 40V B 0.7V
Q315,316 E -0.15V C -40V B -0.7V
Q317,318 D 3.2V G 0V S 3.0V
Q319,320 E 2.8V C 35V B 3.2V
Q321,322 E 2.3V C 35V B 2.8V
Q409,410 E 0.2V C 56.7V B 0.75V
Q411,412 E -0.2V C -56.6V B -0.74V
Q603,604 E 0.29V C 52V B 0.82V
Q401,402 E -0.36V C 46.6V B 0V
Q403,404 E -0.36V C 46V B 0V
Q405,406 E 47.6V C 2.2V B 48.6V
Q407,408 E -52V C -2.4V B -51.6V
Q609 E 51.7V C 40V B 51V
Q607,608 E 52.9V C 51.7V B 52.2V
Q809,810 7 21V 6 0V 5 0.9V 4 0.9V 3 0.9V 2 0V 1 21V
Aurex

PRE AMP & CLEAN DRIVE P.C. BOARD
EQUALIZER AMP & POWER SUPPLY P.C. BOARD
FUNCTION SWITCH P.C. BOARD
LAMP P.C. BOARD

S LOCATIONS


5
6
7
8
A
B
C
D
E
F
Equalizer Amp & Power Supply P.C.Board
Function Switch P.C.Board
Lamp P.C.Board
Volume P.C.Board
Pre Amp & Clean Drive P.C.Board
Chassis Ground
Power Transformer
TO Fuse P.C.Board
TO Main Amp & Protector P.C.Board
TO Headphone & Speaker Selector P.C.Board
BASS
TREBLE
BALANCE
Q301,302
Q303,304
Q305,306
Q307,308
Q309,310
Q311,312
Q313,314
Q315,316
Q317,318
Q319,320
Q321,322
Q401,402
Q403,404
Q405,406
Q407,408
Q409,410
Q411,412
Q413
Q601,602
Q603,604
Q607,608
Q609
Q610
Q611
Q612

FUNCTION SWITCH P.C. BOARD
LAMP P.C. BOARD

Subject to change without notice.